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Acceptance of technological change: Do age, expertise and self-efficacy matter?

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ACCEPTANCE OF TECHNOLOGICAL CHANGE:

DO AGE, EXPERTISE AND SELF-EFFICACY MATTER?

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This study was designed to examine the acceptance of change by employees of different ages, in different contexts. This study challenged the stereotypes held against older individuals by proposing that factors other than age contribute to the acceptance of changes. It examined two context-specific variables, self-efficacy and expertise which contribute to acceptance of technological changes. The findings indicated that older individuals with computer experience had higher self-efficacy. On the other hand, younger individuals had higher self-efficacy, regardless of computer experience. Also, individuals who felt younger than they actually were had higher self-efficacy when they had experience with computers, compared to those who felt older than they were.

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ACCEPTANCE OF TECHNOLOGICAL CHANGE:

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Change is a part of life; it is inevitable in every aspect. Organizations today are facing more changes than ever before as they strive to retain their competitive edge; they are reorganizing, downsizing and implementing new technology. Almost every organization has undergone some type of change in order to survive. Competitive forces command that organizations implement new and technologically advanced mechanisms that enable more work to be done better and faster than ever. Though these pressures stimulate new world-class technology, not everything in this era is new. The work-force is aging as people overall are living longer. Technological and demographic trends demand that organizations examine and capitalize on the way these "new age" skills are acquired by the "aged" workers.

When a change has been introduced into an organization, the employees' response could be either that of acceptance or rejection. In recent times most of the changes taking place have predominantly been technological in nature. With the advent of the computer, the business world changed its processes to incorporate these innovations. Some of the more commonly used technologies are the computer, the World Wide Web and wireless technology, such as mobile phones and video-conferencing. On one hand, these changes succeeded in making the world a global village, but at the same time, they ushered in concerns with regard to the employee acceptance of these changes.

This study showed that the age of the employee had an important role to play in the acceptance of technological change occurring in the workplace. In addition to the age

of the employee, context-based factors such as expertise and self-efficacy, contributed to whether an individual accepts change.

Overview

This introduction will begin by examining organizational change in detail, with an emphasis on technological changes, which is the focus of this study. Later, it will explore how age of the individual contributes to acceptance of change. Next, it will scrutinize two context-specific variables, namely, expertise and self-efficacy, to look at how they could affect the acceptance to technological changes.

Change in the Organization

Change is often seen as an alteration in the happenings of everyday life. Organizational change refers to planned or unplanned transformations in an organization's structure, technology and or people (Baron & Greenberg, 2003). The literature reveals three approaches to the understanding and predicting of the acceptance of change, that is, which people would either accept or reject changes in their lives.

Individual Difference Factors

The first approach is one that focuses on the personality of the individual at hand. It states that some people are likely to either accept or reject changes due to certain stable traits or personality characteristics. This perspective posits that individual differences could be an important component of the individual reactions to change.

Researchers have found that certain individual difference variables facilitate openness to change. Wanberg and Banas (2000) posit that self-esteem, optimism, and perceived control influence whether or not the individual accepts change. Judge,

Thorensen, Pucik and Welbourne (1999) found that responses to change are influenced by certain dispositional traits such as locus of control, self-esteem, positive affectivity, openness to experience and risk aversion. Similarly, Colquitt, Hollenback, Illgen, LePine and Sheppard (2002) found openness to experience to be a moderator of computer-assisted communication effects.

Contextual Factors

Another approach to the reactions to change can be influenced by the context of the change and what it means to the individuals. LePine, Colquitt and Erez (2000) examined stable and changing task contexts and how the reactions to change varied across these different contexts. They found that the actions needed to achieve effectiveness changed within the different contexts. Thus, we can conclude that the situation within which the individual finds himself/herself is crucial to the acceptance or the rejection of change. If the context is one in which the individual finds that he or she is able to cope with the changes, it is more likely that the individual will accept the change and adapt to it.

It is well established that major organizational change is viewed as a formidable stressor in organizational life and is associated with negative outcomes such as job loss, reduced status, conflict at work and home, and threats to the psychological well-being of the individual employee. Unfortunately, coping with change can be very difficult for individuals. Employees experiencing change often feel a loss of territory, are uncertain about what the future holds, and may fear failure as they are faced with new tasks. In a nutshell, the personality variables, situational variables and an interaction of the two play

a role in the acceptance of the changes occurring in an organization. Researchers have found that variables such as age, socio-economic status and position in the hierarchy of the organization determine whether the change will be accepted or not.

Interaction of Individual and Contextual Factors

Another approach to understanding the acceptance of change in individuals can be found in the interaction of context based factors and individual differences. Previous research has shown that both context-specific and personality variables could cause an employee to accept or reject organizational change. For example, Wanberg and Banas (2000) conducted a study in which they examined context-specific as well as individual difference predictors of employee openness to changes at the workplace. The individual difference variables that they measured were: (a) self-esteem, a high sense of self-worth; (b) optimism, highly positive outlook on life; and (c) perceived control, a view of life and situations as being under personal control. Together these individual difference variables can be called a resilient personality, as posited by Major, Richards, Cooper, Cozzarelli and Zubek (1998, in Wanberg & Banas, 2000). On the other hand, the context-specific variables employed in this study consisted of: (a) information about what kind of changes will occur and how they will occur in the organization; (b) participation, which refers to allowing workers to have input regarding a proposed change; (c) change-related self-efficacy, which is an individual's perceived ability to handle change in a situation and to function well on the job despite the demands of the change; (d) social support, which refers to the availability of another individual to turn to for information, affection, comfort, encouragement or reassurance; and (e) personal impact, which is the perceived

effect that a particular change will have on an individual or his or her working environment. In addition to the stated context-specific and individual difference variables, the employees' openness toward changes was also measured.

At the time of this study, the participants were embroiled in a climate of multidimensional and multilevel change as a result of restructuring. The changes occurring were described as "second-order" or "gamma" changes, which involve radical or major modifications of an established framework or method of operating. The participants were assessed at three time intervals. The resilience and contextual variables were assessed at Time 1; the attitudinal outcomes (specific attitudes towards the changes and work- related outcomes) were assessed at Time 2 (2 months later); and actual turnover was measured at Time 3 (14 months later).

The researchers found that increased information and self-efficacy for dealing with the proposed changes were associated with greater change acceptance. Another key finding of this research study was that a resilient personality was related to higher levels of change acceptance. Wanberg and Banas state that an implication of their study for managers is that there is a strong relationship between change-related self-efficacy and change acceptance. They posit that employees may be reluctant to incorporate new procedures, technology, or other changes into their work if they are anxious about their ability to perform their job after the change.

The researchers tested all the possible interactions between resilience and the contextual variables to assess their incremental value as predictors of the outcome variables beyond the main effects. However, they did not find any significant interactions

besides the one between participation and resilience. The individuals with a resilient personality had a high acceptance of change even when participation was low, whereas those with lower level of resilience were accepting of the change only when the participation was high. This research thus suggests that some individuals are more predisposed to accepting changes compared to others as a function of personality differences as well as the context. Further, some individuals could be reluctant to incorporate new procedures, technical or otherwise into their work if they are anxious about their ability to perform their job after the change.

We can thus conclude that change is inevitable in every sphere of life and that there are a few personality traits such as self-esteem, resilience, positive affectivity and openness to experience which predispose an individual to accept changes that occur in an organization. In addition to these personality traits, there are many context-specific variables that contribute to accepting changes, such as change-related self-efficacy and information about changes. However, these changes that take place within an organization can be of any kind.

We have examined the different factors that influence the acceptance of changes. The next section talks about a more specific kind of change that has become predominant in recent times: technological change.

Technological Change

Computers have been introduced in almost every organization as an effort to modernize and keep abreast with the world. Technology is the corpus of knowledge and set of techniques which manipulate and control the physical world to satisfy human wants

(Girifalco, 1991). Computer tasks are becoming increasingly prevalent in many segments of the labor force. Most workers interact with some form of technology in the routine performance of their job (Czaja, Sharit, Nair & Rubert, 1998). One important implication of the pervasive use of computers is that users of computer-based systems are no longer restricted to technical specialists. Current user groups vary on a number of characteristics including age, education, technical expertise and basic abilities.

Today's business analysts claim that we are currently experiencing an industrial revolution; one driven by a new wave of economic and technological forces centered on the use of computers and the internet (Baron & Greenberg, 2003). An example of such a technological change is how the work of senior scientists and engineers altered drastically in the mid-1970s, when their ubiquitous plastic slide rules gave way to powerful calculators. This change progressed further as calculators were replaced a year later by desktop microcomputers.

Girifalco (1991) thus suggests that technological change generally focuses on the techniques, their attendant devices, products and processes and the effects of these on individuals and society. Information technology has been one of the most recent changes incorporated into virtually every organization. Since the early 1990s, various organizations have been changing their systems to incorporate these technological changes. Some of the more commonly used advances would include the use of computers and the various related applications like the internet, wireless technology like video-conferencing, mobile phones, etc. The willingness and speed of learning how to make use of these novel technical applications could vary among individuals, with some finding it

more difficult than others. At the introduction of a new technology, there have been those who have who have embraced the changes and others who have raised cautions and concerns (Westby & Atencio, 2002).

Attitudes towards Computers

Baldry (1988) proposes that one must view technological change in the organization in terms of the deep- rooted attitudes that see technology as: (a) either progressive or threatening and (b) either inevitable and determining or a human creation and therefore determinable. Westby and Atencio (2002) conducted a review on computers, culture and learning. Based on that they posit that attitudes towards the use of computers technology seem polarized. At the introduction of a new technology, there have been those who have embraced the changes, and others who have raised concerns. Computer technology is not inherently good or bad. Its value and influence depends on the attitudes of the users of the technology. Often the manner in which individuals approach such technological advances will determine how they perform.

Acceptance of Technological Changes

The pervasive use of computers in work settings implies that an increased number of workers, with varying levels of skills and abilities, are performing computer-based tasks. Czaja, Sharit, Nair and Rubert (1998) conducted a study to investigate the impact of computer experience on the performance of a real world data-entry task. In addition to this, they also investigated the impact of age and cognitive abilities (visual-spatial skills). All the participants had the same level of education. These researchers indicated if participants had any previous experience with a computer, to categorize them into groups

with little use, no use or frequent use with computers. Attitudes towards computers were assessed prior to training and following task performance. Results showed that older people performed more slowly and completed less work than younger people on a data-entry task. However, it must be noted that the computer task in question was judged based on speed and accuracy of performance, which could be a reason why the older people had a lower performance. In addition, the people with computer experience had higher rates of work output, probably due to the fact that they had more experience with the computer keyboard and basic computer commands and operating procedures.

The work-force needs to adapt to changes in the organization, especially those that are technological in nature. Every individual in the organization must be able to cope with these changes, whether young or old, i.e., learn how to use the computer and all its applications, in order to keep pace with the others in the organization. Such a necessity brings about an important issue, which may have come up in recent times in research literature, namely, that the age of the individual is an important determining factor in the acceptance of changes in the organization, especially technological changes.

Age of the Employee

The Aging Workforce

The labor force is aging, and its size is increasing slowly. The US Department of Labor used 55 years as a cut-off to define "older workers" (Rix, 2001). The proportion of the labor force that is "older" is projected to rise from 12.9 % in 2000 to 16.3 % in 2008, 19.6 in 2015 and 20.1 % in 2025. The number of older workers, which stood at about 18.2 million in 2000, is projected to rise to 25.2 million in 2008 and to 31.9 million in

2025. This represents a 38 % increase over the next decade and a 75 % increase over 25 years. There is reason to suspect that the actual number of older workers will exceed 25 and 32 million.

Waskel (1991) found that those workers who are considered to be mid-life and the older workers in the organization are becoming a larger portion of the work force. They are people that businesses and organizations will need to depend on throughout the twenty-first century. They are the 35-year-olds who are beginning to address the developmental tasks of mid-life. They are the 45-year-olds who have completed some of those tasks but are beginning to address some other areas they need to address. They are the 50-year-olds who are beginning to realize that half of their life is almost over. This signifies that the age cut-off to indicate who is an older worker has not been empirically determined.

Until recently people died at a very early age as compared to today's death rates. Advances in science have contributed to various factors that lead to an increase in mortality, some of which are control of diseases, better health care facilities and safer work environments. Because people are living longer and are in better health, chronological age has become a predictor of the least effective measures of one's age. Age has always been a very dicey construct when used in an experimental design.

There were three measures of age used in this study – chronological, subjective and perceived age. The subjective age of an individual refers to how old/ young the individual perceives him-/herself to be (Barak & Stern, 1986). Cleveland and Shore (1997) have found that it reflects the age group with which the individual feels closest,

either directly (i.e., on the basis of chronological age) or indirectly (i.e., on the basis of shared characteristics, such as appearance and interests). Interestingly, Steitz and McClary (1988) found that although chronological and subjective age are correlated, differences occur across the life span with greater discrepancies at older ages. Perceived age on the other hand reflects the age that one thinks one is as compared with others in his/ her workplace in terms of how they look, feel and act.

The next sections will delve deeper into the aspect of stereotypes associated with age and how individuals internalize them. It will examine how society has certain preconceived notions about older adults and how these prejudices are ultimately absorbed by the individual causing detrimental effects.

Age Stereotypes

Social psychologists have studied stereotypes in all spheres of society. They were initially defined by Walter Lippmann (1992, as cited in Judd and Park, 1993) imprecisely as generalizations about social groups that are rigidly held, illogically derived and erroneous in content. Judd and Park (1993) developed a working definition of stereotypes based on a number of sources that discussed stereotypes. They define it as an individual's set of beliefs about the characteristics or attributes of a group.

After years of research, it is now believed that stereotypes can be both positive as well as negative. Stereotypes associated with age are both positive and negative. Some researchers have found that younger individuals have positive attitudes towards older individuals. Hummert (1990) found that younger individuals have varying conceptualizations about the older individuals based on the adjectives used to describe

them. Slotterback and Saarnio (1996) found that older adults are typically accorded with wisdom and commonsense. On the other hand, Sneed and Whitbourne (2005) state several specific negative stereotypes associated with aging that an individual is exposed to throughout life. They range from psychological and cognitive malfunctioning to the rigidity and inability to cope with declines associated with aging to the unidimensionality associated with aging, where it is believed that all individuals tend to behave and act like each other as they age. They have found evidence that contradicts the above assumptions. However, in this study we were interested in those that have been erroneously attributed to certain sections of society that result in negative self-attributions.

Age Stereotypes and Their Consequences

Age stereotypes have been known to exist at the workplace. The most prevalent among them is one that perceives the older individual as deficient in ability and lacking the interest in learning and developing at the workplace. A relatively small amount of research on workplace behavior has suggested that as employees get older, they tend not to be involved in training and development activities as much as younger employees. In addition to this, the advent of technological changes has in itself brought about a series of stereotypes. A very common one that operates, especially in the work context, is that older employees find it more difficult to adapt to and learn about these advances as compared to younger employees.

A study conducted by Perry, Kulik and Bourhis (1996) highlights some of these stereotypes in relation to the selection process. They found that jobs considered appropriate for younger people were likely to have young candidates selected to it

compared to the older type jobs. The authors also found that older worker stereotypes are more likely to be used to influence applicant evaluations when raters were biased against older workers. This study highlighted that stereotypes exist in certain aspects of the work place; hence we can assume that such stereotypes could very easily exist in other areas of organizational functioning, such as accepting technological changes.

Internalization of Age Stereotypes

The stereotypes that exist about older workers being less receptive to change often perpetuate the beliefs of the older worker. They come to believe that they are indeed incapable of coping with technological changes introduced in the organization. Such beliefs could lead them to undermine their ability to learn and cope with these changes (Wanberg & Banas, 2000). Especially in a time when organization processes are constantly changing, it is the older worker who feels threatened as he/ she tends to doubt his/ her capability in coping with the added demands at the workplace and being able to be as good if not better than the younger workers. Rebok & Offerman (1983) found that older workers may experience more anxiety in learning situations, whereas other research has found relations between age and a perception of decline in one's own abilities that may be relevant to learning. With changes predominantly occurring in the technological aspects of work, like actual information technology changes, the older workers come to believe that they will not be able to operate such systems and very often give up even before they try.

Warr and Fay (2001) conducted a study to investigate the personal initiatives of individuals as a function of age. This salient aspect of the overall characteristics of an

individual has been found to be lower at older ages. Thus, older individuals are less likely to engage in personal initiative behaviors compared to the younger individuals. The participants in the study were drawn from the city of Dresden, Germany. Data from full-time employees were collected in two waves, with a gap of 14 months between them. The participants were subject to interviews where their personal initiative was measured. The results showed that older German employees of both sexes exhibited less initiative than younger ones. They stated that personal initiative has some overlap with change orientation. Hence, they conclude from these findings, that in order to cope better with economic and technological changes the older individuals need to be active learners. Reduced personal initiative by older employees suggests that active efforts are needed to increase their learning effectiveness.

Internalization of Stereotypes and Self-fulfilling Prophesies

Jussim, et.al. (2005) reviewed research to answer questions about the connections between social beliefs and social reality, also if people routinely change their behavior to fit other's expectations. Self-fulfilling prophesies occur when one person's erroneous explanations for a second person cause that second person to behaviorally confirm the originally erroneous expectations (Jussim, 1991). They examined these beliefs in various settings like, schools and the military. In each of these settings they found that the target individual's changed their behavior significantly just as a result of the expectations of the perceiver or the individual who has the expectations.

In the same way one can conclude that looking at the evidence stated earlier about stereotypes and how older individuals are viewed in different settings, they internalize

these erroneous beliefs about themselves and start to behave in ways that would confirm these expectations. These stereotypes permeate the organizational setting like any other; as a result the older individuals in these settings are very likely to have a low self-efficacy for any aspect that is new in the workplace.

Age and Acceptance of Change

The older and younger employees have differing reasons for accepting or rejecting technological changes. The relevant value of these changes for the employee varies according to what these individuals' views as important. Morris & Venkatesh (2000) conducted a study in which they investigated age differences in individual adoption and sustained usage of technology in the workplace using the theory of planned behavior. The study took place in a medium-sized financial accounting firm that was in a process of implementing a new technology for its customer account representatives. The specific software being introduced was a new Windows 95 based organization- wide system for data and information retrieval. Training sessions were conducted over a period of 2 weeks with about 25 participants in each session. User reactions and usage behavior were measured over a period of 5 months. User reactions to the technology were gathered at 2 points in time: immediately after the initial training (t_1) and after 3 months of experience (t_2). Actual usage behavior was measured over a 5- month period from the time of initial introduction of the technology.

The results showed that age was one of the main factors that determined the importance of various factors in technology adoption and usage in the workplace, with older workers placing more importance on ease or difficulty of using the technology, and

younger workers placing greater importance on the costs and benefits of using the new technology. Thus, we observe a clear difference in the manner in which older and younger workers accept technological changes taking place in the organization. The authors suggest that a plausible explanation for the occurrence of such a finding could be that the older employees may be much more accustomed to seeking and applying traditional (i.e., non-technology) solutions to job-related tasks, whereas younger workers are much more reliant on the use of technology for job accomplishment.

Thus, keeping in mind the above evidence, one could conclude that the age of the employee plays an important part in the acceptance of change. Stereotypes state that the older the employee the more unlikely it would be for him/ her to accept change. Research conducted has provided evidence for this, specifically in a technological change. The older employees tend to be less accepting of technological changes due to their beliefs that they lack the skills or the knowledge needed. Thus, an important factor in examining why such older employees find it more difficult to accept change would be their belief in their ability to learn how to use this new technology.

In the following sections, I will enumerate the two context-specific variables being used in this study, they are, expertise and self-efficacy.

Expertise

Most research classifies people into two categories, experts and novices, with experts representing the most experienced and novices the least experienced (Vu, Hanley, Strybel & Proctor, 2000), where they differ greatly in terms of their performance and abilities. They conclude that experts are very skilled in their domain and can apply their

knowledge more effectively than novices. The number of years an individual spends in a particular job contributes to his/ her familiarity with the procedures involved in that job. On a more general level, the study of expertise seeks to understand and account for what distinguishes individuals in a domain from less outstanding individuals in that domain, as well as from people in general (Ericsson & Charness, 1994).

Bedard and Chi (1992) state that the past two decades have generated significant amounts of research on the nature of expertise. These studies have shown that a large, organized body of domain knowledge is a prerequisite to expertise. They state that experts possess a greater quantity of domain-relevant knowledge than do novices. However, it's not merely the fact that experts have more knowledge that is important; more crucially, they have their knowledge organized in particular ways, ways that make that knowledge more accessible, functional, and efficient.

According to Webster (1979, in Shanteau & Stewart, 1992), an expert is someone "displaying special skill or knowledge derived from training and experience." Foley and Hart (1989) define an expert as someone who has attained a high level of performance in a domain as a result of years of experience. They state that experts have a thorough understanding of the fundamental principles that are involved, based on lengthy experience and often on extensive training. Experts can often do "automatically" things that non-experts or novices can do with a great amount of effort or not at all. That is, what comes naturally to an expert comes with great difficulty or not at all to a novice in the same field. They further mention that an expert is competent at handling tasks that fall in the domain of his/ her experience. Experts are more adapted to learning new tasks, as

they have the resources readily available to process the new information. An expert is someone who has an extensive and up-to-date knowledge about his/ her subject area or content area.

Ericsson and Charness (1994) state that attaining an expert level of performance in a domain requires mastery of all of the relevant knowledge and prerequisite skills. They document expert performance from a life span perspective. They provide evidence that research has shown how expert performance seems to peak at different stages in life and in different domains. For example, peak performance in athletic activities seems to be around the twenties, with systematic differences between various kinds of sports (Schulz & Cornow, 1988, in Ericsson & Charness, 1994). The authors conclude that based on the evidence from prior research, the relative decline with age might be slight.

Age and Occupational Experience

Studies have been conducted to map out the relationship between age and occupational experience. Predominantly, however these studies have shown that experts are always at an advantage as compared to novices (Morrow, et. al, 2001; Salthouse, 1991). Morrow et. al. (2001) has found that expertise benefits occur for adults of all ages.

Participants in a study by Salthouse (1991) consisted of 132 men whose background was either engineering or computers. They were made to perform a task created to resemble an activity performed by many engineers, which was the interpretation or two- dimensional drawings of three- dimensional objects. As predicted, the task was performed much better by the subjects with the engineering background since it was their area of expertise as compared with those who had a background of

computers. He also found that older individuals performed just as well or better than the younger individuals. Thus, this study shows that the presence of expertise in a particular task or being younger in age does not predispose an individual to perform better than another who may not be an expert in that field. Indeed, this shows that expertise in any field does not depend on age, rather it depends on the level of experience that the individual has had in that domain.

A study by Morrow et. al. (1994) examined the effects of interaction effects of age and expertise on task performance. Their study sought to examine whether aviation expertise reduces age differences in understanding and remembering narratives. The subjects in question were pilots and non- pilots. Current and retired pilots and age-matched non- pilots read and recalled aviation or general topic narratives. While they read they periodically chose the referents for target pronouns referring to main or minor characters in the narratives, which were mentioned either in a sentence immediately before the target sentence or two sentences before the target. The results showed that expertise improved and aging reduced referent choice and narrative recall accuracy and benefited older and younger subjects equally. Thus, the younger the pilots were and the fact that they were experienced, aided the fact that they chose better referents as compared to the older pilots even though they were experienced.

Thus, predominantly, the research in this field suggests an interaction among the effects of age and expertise when determining performance. This indicates that although it is commonly believed that the expert always has an advantage over the novice,

regardless of the field they are in, these expertise effects continue to be beneficial even as the individual ages.

Expertise and Age Differences

Salthouse (1987) conducted a number of studies on age and expertise and concluded that expertise might either reduce age differences or benefit older or younger individuals depending on the type and difficulty of the task. His research also suggested that expertise could reduce age differences in several ways. First, older experts may be more highly selected than the general population and thus less likely to experience age declines in cognitive abilities. Second, older experts may maintain proficiency on specific skills involved in the study because of many years of practice. Third, older experts may rely on skills or strategies that circumvent hypothesized age- related declines in cognitive resources, such that age differences are eliminated, or at least are reduced for experts compared to non-experts. Thus, his research and the conclusions he drew from them, all support the fact that expertise is an important component to accomplishing a task and that this characteristic is important at every age group, be it young or old individuals.

Tsang & Shaner (1998) conducted a study to help try to resolve inconsistencies observed in the literature of age and expertise. Ninety participants were recruited for 3 age- groups: 20 – 39, 40 – 59 and 60 –79 years old. Each age group had 15 pilots and 15 non- pilots. All participants were matched on vision and hearing. All pilots had a minimum of 750 hours of total flight time and flew at least monthly. They performed six single tasks and five dual tasks composed of the single tasks. The single tasks were: a horizontal- axis tracking task, a vertical- axis tracking task, two spatial orientation tasks

called the Plankin tasks and two Sternberg short- term memory tasks. The results showed that there was strong evidence for age- related deficits in time- sharing efficiency and resource allocation beyond those of general age –related declines. However, the age-related deficits appeared to be prominent only for age 60 years or beyond, under intense attentional demands, and when precise control was required. Further, the expertise effects and the practice effects observed over the course of the experiment showed age effects can be attenuated by training.

Most of the research conducted to date has focused on the performance aspect of the expertise. It has focused on the physical tasks, for example, pilots and mechanical engineering tasks, which require the interaction of cognitive and tactile skills of the individuals which have been shown to decline over time in adults. Keeping this in mind, a look at the above studies brings out a need for research on the interaction of age and expertise in an organized setting like the workplace. The study focuses on the attitudinal aspect of expertise, that is, whether the individual has the capacity and the expertise to accept the changes that are taking place in the organization and cope with them. Computers and the use of it's applications have become pervasive in the present day work setting. The more familiar an individual is with the technological changes taking place in the environment, the more likely it is he/she will be able to accept these changes with ease. Those who have prior experience with computers and its different applications will find it simple to accommodate changes in these areas.

The following section describes the importance of another context-specific variable, namely, self-efficacy, on the acceptance of change. The belief in one's ability to

perform a certain task contributes to whether the individual will accept organizational changes. This section explores the nature of the relationship between self-efficacy and acceptance of change.

Self-Efficacy

Self-efficacy is a concept emerging from the social learning theory and refers to an individual's belief in his or her own ability to accomplish a task. Armenakis, et. al. (1993) state that "individuals will avoid those activities that they believe will exceed their coping capabilities but will undertake and perform those which they judge themselves capable of" (p. 686). Thus, an important aspect of being able to accept the change is the belief in oneself and one's capability to cope with the occurring changes. Self-efficacy appraisals commonly vary as a function of social contexts. People routinely display high self-efficacy appraisals in some contexts and low self-efficacy appraisals in others (Cervone, 1997; Cervone, Shadel, Jencius, 2001).

What is self-efficacy?

An individual will consider him-/ herself to be capable of adapting to and accepting changes only to the extent that he/ she believes it is possible. This is known as the self-efficacy of the individual. Bandura (1995) defined self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainment." He also states that self-efficacy is a generative capability in that it enables individuals to integrate cognitive, social, emotional and behavioral sub-skills to accomplish a particular objective. Bandura (1986) also defines it as, "People's judgments of their capabilities to organize and execute courses of action required to attain

designated types of performances. It is concerned not with the skills one has but with the judgments of what one can do with whatever skills one possesses" (p. 391). An individual's level of self- efficacy determines whether behavior will be initiated, how much effort will be expended, and how long the behavior will be sustained in the face of obstacles. Those who have a strong sense of self- efficacy in a particular situation will devote their attention and effort to the demands to the situation, and when faced with obstacles and difficult situations, these individuals will try harder and persist longer. Such individuals are also inclined to attribute failures on difficult tasks to insufficient effort.

Bandura (1995) empirically studied the personality characteristics of individuals and found that there are very clear cut differences between the characteristics of people with high versus low self- efficacy with regards to beliefs about performance in everyday life, and, in particular, performance in adverse circumstances.

People with a high sense of self- efficacy trust their own capabilities to master different types of environmental demands. They tend to interpret demands and problems more as challenges than as threats or subjectively uncontrollable events. High perceived self- efficacy enables individuals to face stressful demands with confidence, feel motivated by physiological arousal and judge positive events as caused by effort and negative events as due primarily to external circumstances. They believe they have the ability and resources to accomplish specific tasks, and this belief motivates goal setting, strategic planning, effort and performance. Employees with high-efficacy may be better able to seek, integrate and interpret information. They are more focused on task requirements and less distracted by performance anxiety.

In contrast, individuals with low self-efficacy may doubt their ability to accurately interpret information and feedback, thus doubting their capacity to adapt to changing situations in the workplace. Individuals with low self- efficacy tend to be distracted by ruminations about perceived inadequacies and failures, which consume limited cognitive resources that are needed to process task demands and seek, attend to, integrate and interpret information effectively.

Jussim (1986) studied the effects of individual's self-efficacy beliefs. The results suggested that an individual's belief about his/ her abilities (self- efficacy) moderate the way individuals react to low expectations. Individuals who believe themselves able to perform will choose to disprove the holder of those low expectations by increasing their efforts and subsequently, may even increase their performance level. Thus, results from such studies on accepting organizational change suggest that high self- efficacy is a precursor for positive attitudes towards critical career- oriented events, specifically those involving major job and organizational change.

The following section will take a look at how self-efficacy contributes to coping with change.

Self-efficacy and Coping with Change

Accepting change could be contingent upon believing in ones ability to cope with these changes. Employees experiencing change are uncertain of what the future holds and may fear failures as they are faced with new tasks to successfully cope with the changes in the organization. Recall that as mentioned earlier, change related self- efficacy has been defined by Wanberg and Banas (2000) "as an individual's perceived ability to

handle change in a given situation and to function well on the job despite demands of the change" (p. 134). They suggest that individuals do not perform well in change contexts when they are not confident about their abilities. "Individuals will avoid activities believed to exceed their coping capabilities but will undertake and perform those which they judge themselves capable of" (Armenakis, 1993, p. 686). Thus, the individual's self-efficacy has an impact on whether he/ she will accept change. The contexts, with which the individual is familiar, are those in which it will be easy to be open to changes.

Self- efficacy has been found to positively influence performance in many work contexts (Stajkovic & Luthans, 1998). Greater task focus thus enables individuals with high self-efficacy to accurately interpret information and adapt to changes in the organization. Low self- efficacy levels have correlated with defensive behaviors such as resistance to change and protecting one's turf (Ashforth & Lee, 1990). In addition, some researchers have noted that self- efficacy is particularly salient in situations that an individual may regard as novel, unpredictable or stressful.

The self-efficacy of an individual can thus be viewed as an important factor in moderating the acceptance of change by an individual. It is critical to the success of any change introduced in the organization. If the employee believes that he/ she will not be able to cope with these changes, it is very likely that he/she will not accept the changes.

Interaction Between Self-efficacy, Expertise and Individual's Age

Artistico, Cervone and Pezzuti (2003) explored the possibility of person by context interactions for older and younger employees. They posited that when comparing older and younger populations, there might not be a simple main effect in which younger

persons have an overall higher sense of self-efficacy than older adults. Instead they might be person by context interactions in which older adults display low self-efficacy in many domains but relatively high self-efficacy beliefs within domains in which they experience mastery in their daily life.

Artistico, Cervone and Pezzuti (2003) used everyday problems, or as they termed them, as "ecologically relevant everyday problems" to signify the expertise of the individual. In everyday problem-solving tasks, the problems are ecologically representative of individuals' daily challenges, there often are multiple viable solutions to a given problem and the generation of solutions requires drawing on personal knowledge gained through social experience.

By means of a diary study they identified ecologically relevant problems. They used two groups of participants and assessed their perceived self-efficacy for solving those problems. As predicted, they found a highly significant interaction between age and problem type. For both the groups, self-efficacy perceptions varied in accord with the ecological relevance of the problems presented.

The finding that older adults had higher self-efficacy than the young on problems that were ecologically relevant to them raises the possibility that older individuals could be more accepting of changes if they occur in their domain of expertise, or if they are familiar with the basic nature of the changes introduced.

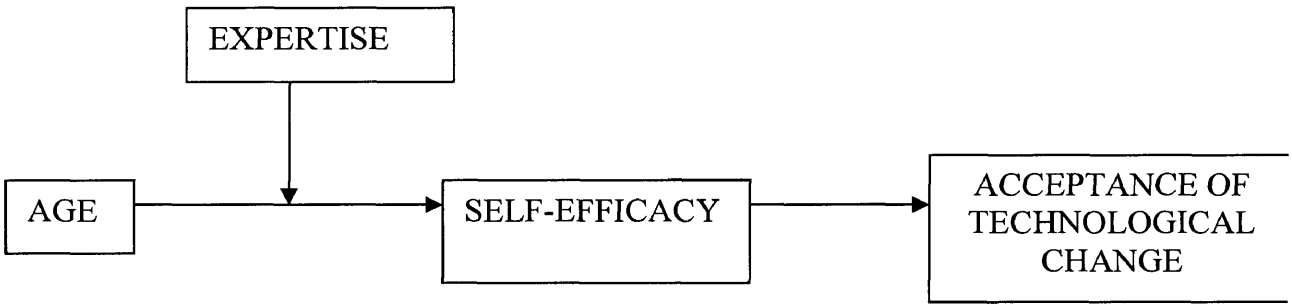
Thus, it has been established that the context-specific variables, expertise and self-efficacy influence the individual's acceptance of change irrespective of age.

This Investigation

Change has become a way of life in every organization; with the advent of the information technology age, employees are being continuously challenged to adapt to these changes more than ever before. Survival in a particular organization often depends upon whether one is able to accept these changes and work with them. Jobs previously completed via paper and pencils are now completed by the means of a computer. Individuals must become more accepting of such technological changes. Research cited earlier in this paper has shown that certain individuals are predisposed to being more accepting to change than others.

Figure 1

The proposed model of study



The workplace is aging, and older workers are becoming a larger portion of the workforce. Technological changes occurring in the organization are interpreted as more challenging to older employees than younger ones. There is a common belief or stereotype that older individuals are less likely to be accepting of change than their younger counterparts. This study sought to challenge this commonly held belief, and

proposed that the older individuals are more likely to accept change when compared with younger individuals as a result of other factors, both contextual and individual. Figure 1 shows the relationships that were explored in this study.

Context-specific variables, personality traits and the interaction of the two contribute to the acceptance of technological change by the individual regardless of his/ her age. This study focused on two context-specific variables: expertise and self-efficacy. Each of these has been shown to contribute to acceptance of technological change, either by itself or through and interaction with another variable.

Self-efficacy is the belief in one's ability to perform well on a job. The mere belief in oneself to perform a task well leads to a person being more open to changes in the environment, and more specifically in the workplace. Research has found that those who had higher self-efficacy were more likely to accept changes in the organization as compared to those with a lower level of self-efficacy.

Experts and novices differ from each other. Experts are more knowledgeable regarding their domain area and often seem more competent. Research about the impact of expertise on the acceptance of change has shown to be positive. Based on the evidence stated above, the following hypotheses were proposed:

Hypothesis 1: Expertise will moderate the effect of age on self-efficacy, such that older individuals with more expertise will have higher self-efficacy whereas, older individuals with lesser expertise will have lower self-efficacy. On the other hand, younger individuals will have high self-efficacy regardless of expertise.

Hypothesis 2: Self-efficacy will mediate the relationship between age, expertise and the acceptance of technological change, such that older individuals will have higher self-efficacy if they have expertise, which will make them more accepting of technological changes. Younger individuals will have higher self-efficacy, regardless of expertise, making them more accepting of technological changes.

METHOD

Participants

Sixty faculty members from the College of Education at the University of Nebraska at Omaha, varying in age and tenure with the university, who were exposed to myMAPP served as participants. myMAPP is an online portfolio management program that enables the faculty to keep a record of their achievements such as publications, honors and awards. This portfolio can be updated at any point in time to keep the record of the faculty member up-to-date. The phase of myMAPP that was used for this particular study was a trial phase in which only the faculty members of the College of Education were tasked with uploading their portfolio. The results from this trial phase were to be used to refine the system as well as troubleshoot any problems that were encountered.

Measures

Exogenous Variables

Age

Chronological Age. This is the actual age of the participant. Participants indicated their date of birth.

Perceived Age. Perceived age on the other hand reflects the age that one thinks one is as compared with others in his/ her workplace in terms of how they look, feel and act. Perceived Age was measured using the scale developed by Cleveland, Shore and Murphy (1997). This scale has three items (e.g., Compared to the average age of members of my work group, I FEEL). The response options were 'Older', 'Younger', 'About the same age,' which were scored 1, 3 and 2 respectively (α= .73). See Appendix A for complete scale.

Subjective Age. The subjective age of an individual refers to how old/ young the individual perceives him-/herself to be (Barak & Stern, 1986). Subjective Age was measured using the scale developed by Cleveland, Shore and Murphy (1997). This scale has four items (e.g., The way you generally feel). The response options to this 5-point scale were '25-35', '36-45', '46-55", "56 and older', which were scored one to five respectively (α= .73). See Appendix A for the complete scale.

Expertise

The change in question was a technical one, hence there were likely to be differences in the experience that individuals had with computers and their use. Participant expertise was assessed by using tenure as well as a computer experience questionnaire.

Tenure. The tenure of the participants was obtained by asking them for the number of years they had been at their current job.

Computer Experience Questionnaire. In this questionnaire participants indicated if they had ever used a computer and if so to rate the duration of experience, the

frequency of use and breadth of computer knowledge (a scale developed by Ann Fruhling, 2005). Responses to the questionnaire were categorized as follows: no prior experience; some experience (very little knowledge and infrequent use); a lot of experience (knowledge of a few applications and occasional use) and expert (broad knowledge and frequent regular use). For the purposes of analyses, only the first 4 items were used because they capture the actual amount of experience the individual has with using a computer.

It is important to note that this scale includes both items of a subjective and objective nature. The first two items asked participants to indicate how many hours they spend on the computer and internet and how many times they use these technological services, making these items an objective measure of computer experience. The third and fourth items asked the participants for a 'subjective measure of their computer experience.' These items were crucial to the results of the study which primarily sought to determine and predict the attitudes of individuals towards technology, the belief they have that they will be able to accept any technological changes that may occur (self-efficacy) and, in turn how their self-efficacy affects their acceptance of change. See Appendix B for the complete scale.

Endogenous Variables

Self-Efficacy

Self-efficacy is defined as an individual's judgment of his/ her own capabilities to organize and execute courses of action required to attain designated types of

performances (Bandura, 1995). Two measures of self-efficacy were obtained: job self-efficacy and change-related self-efficacy.

Job Self-efficacy. Job Self-efficacy was measured with the Personal Efficacy Beliefs Scale developed by Riggs, Warka, Babasa, Bentancourt and Hooker (1994). This scale consists of 10 items (e.g., "I have confidence in my ability to do my job", "I doubt my ability to do my job" (reverse scored), "I am very proud of my job skills and abilities." See Appendix C for the complete scale.

Change-related Self-efficacy. Change-related self-efficacy was assessed using a 4-item measure developed by Ashford (1988). This was assessed using a 5-point response format ranging from agree to disagree (e.g., I get nervous [that] I may not be able to do all that is demanded of me by the restructuring). See Appendix C for the complete scale.

Acceptance of Change

The acceptance of change scale was adapted from an existing scale developed by Oreg (2003) to assess the affective aspect (e.g., I'm excited about this change) and cognitive aspect (e.g., The move will do us all good) of the acceptance of change. This was measured using a 5-point response format ranging from agree to disagree The reliabilities of the above mentioned change aspects are .78 and .86 respectively. See Appendix D for the complete scale.

Procedure

All the participants were solicited by means of an email, as shown in Appendix E, which contained a link to a website that contained a questionnaire. The email explained the purpose of the study as well as thanked them for their time and participation. The

questionnaire began with some questions that required the participants to state their date of birth and the number of years of service in that particular job. All the above mentioned questionnaires were included to make up this questionnaire.

Results

The target audience of this study was 60 faculty members from the College of Education at the University of Nebraska at Omaha. However, only 43 faculty members from the college responded to the survey after a total of three requests from the principal investigator and her advisor. This provided a 71.67% response rate which according to Matthews, Boon, Flisher and Schaalma (2006) is an acceptable response rate for a survey.

Before any of the analyses were conducted, all the variables were centered. Centering involves subtracting the mean of the variable from each value (Aiken & West, 1991). West, Aiken and Krull (1996) state some advantages to centering continuous variables. Centering ensures that the interpretation of effects will occur at the meaningful value of the continuous variable, which occurs as a result of making the mean of the variable 0 while preserving the units of the scale. Yet another advantage mentioned by these authors is that centering makes the regression model analogous to the ANOVA model which enables the interpretation of a main effect across all levels of other factors. Finally, centering reduces multicollinearity as it eliminates non-essential ill-conditioning.

Descriptives

The descriptive statistics for the exogenous variables are stated in Table 1, which includes the three measures of age and the two measures of expertise. The average chronological age of the participants in the study was 52.16 years, and the average tenure

of these professors was 11.98 years. Tables 2 and 3 present the endogenous variables used in the study. This includes the two measures of self-efficacy and the measure of acceptance to change. The statistics show a noteworthy variance in the age and tenure of the participants.

Table 4 depicts the correlations among the different variables included in this study as well as the reliability of the different measures on the sample. The reliabilities range from medium to high. The age measures have the highest reliability, whereas the measures of expertise and acceptance of change have medium reliability.

Correlations were run between the variables included in this study. As expected all three measures of age, perceived, subjective and chronological, were positively correlated with each other. Chronological age had a strong positive correlation with subjective age, $r = .83, p < .01$, whereas it had a positive correlation with perceived age, $r = .33, p < .05$. Subjective and perceived measures of age had a positive correlation, $r = .60, p < .01$.

Change-specific and personal beliefs self-efficacy were moderately correlated with each other, $r = .57, p < .01$. Both of the measures had a positive correlation with both the measures of expertise, experience with computers and tenure. Both change-specific and personal beliefs self-efficacy had a positive correlation with acceptance of change, $r = .45, p < .01$; $r = .54, p < .01$, respectively.

Expertise was correlated with all the three measures of age. Also, tenure was positively correlated with subjective, perceived and chronological age, $r = .68, p < .01$; $r = .47, p < .01$; $r = .62, p < .01$, respectively.

Acceptance of change was positively correlated with the measures of age; however, none of these correlations were significant. This positive correlation implies a trend that older individuals are accepting of changes. As mentioned earlier, acceptance of change had a significant positive correlation with self-efficacy, as well as both the measures of expertise, neither of which was significant.

Table 1

Number of participants in the different age groups

Age Group (in years)	Number of participants
25 - 35	5
36 - 45	6
46 - 55	9
56 and above	23

Table 2

Descriptive Statistics for Exogenous Variables

	Number of Items	Absolute Range	Sample Range	Mean Score Per Item	Mean Score Total	Variance	SD	Median	Mode
Measures of age									
Chronological age			31 – 65		52.16	96.99	9.85	56	58
Subjective age	4	4 - 16	4 – 16	2.61	10.42	16.54	4.07	11	16
Perceived age	3	3 - 9	3 – 8	1.63	4.88	2.72	1.65	5	3
Measures of expertise									
Computer experience	4	4 - 16	6 – 16	2.91	11.62	4.67	2.16	12	13
Tenure (in years)			1 – 32		11.98	87.74	9.37	9	6

N = 43

Table 3

Descriptive Statistics for Endogenous Variables

	Number of Items	Absolute Range	Sample Range	Mean Score Per Item	Mean Score Total	Variance	SD	Median	Mode
Measures of self-efficacy									
Personal beliefs self-efficacy	10	10 - 50	10 – 35	2.15	21.49	33.16	5.76	21	19
Change-specific self-efficacy	4	4 - 20	4 – 12	1.67	6.7	4.03	2.01	7	4
Self-Efficacy (total)					24.4	31.6	5.62	24	24
Acceptance of change	9	9 - 45	19 – 41	3.62	32.58	24.68	4.97	33	33

N = 43.

Note. Personal-beliefs Self-efficacy, Change-specific Self-efficacy and Acceptance of Change measured using 5-point scales

Table 4

Intercorrelations Among Study Variables

		2	3	4	5	6	7	8	9
1	Chronological age	0.83**	0.33*	0.08	0.62**	0.17	-0.02	0.03	0.21
2	Subjective age	0.94	0.60**	0.06	0.68**	0.16	-0.08	-0.12	0.02
3	Perceived age		0.82	0.09	0.47**	0.02	-0.1	-0.19	0.07
4	Computer experience			0.67	0.23	-0.3	-0.11	-0.16	0.03
5	Tenure				-	-0.11	-0.07	-0.11	0.18
6	Personal beliefs self-efficacy					0.82	0.57**	0.50**	0.54**
7	Change-specific self-efficacy						0.68	0.92**	0.45**
8	Self-Efficacy							-	0.44**
9	Acceptance of change								0.68

*Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

Note. The reliabilities for the scales used in the study are stated along the diagonal

Effect of Age and Expertise on Self-efficacy

Hypothesis 1 predicted that older individuals with expertise would have higher self-efficacy compared to older individuals with lesser expertise. On the other hand, younger individuals would have high self-efficacy regardless of expertise. This was tested using a hierarchical regression. This determined whether expertise had an effect on the relationship between age and self-efficacy. Six hierarchical regression analyses were conducted using the three measures of age: chronological, perceived and subjective, as well as the two measures of expertise: computer experience and tenure. The two measures of self-efficacy; personal-beliefs self-efficacy and change-specific self-efficacy, were summed and the mean of the two was used for all the analyses. The measures of self-efficacy were summed because they measure two related facets of efficacy (i.e., the belief in ones ability to perform the task at hand as well as the ability to cope with the technological changes occurring throughout the organization). In each of these analyses the age and the self-efficacy measures were entered in the first step, and the interaction of the two was entered in the second step.

The first set of regressions was conducted to determine the relationship between the various measures of age and computer experience, as a measure of the individual's expertise, on the self-efficacy of the individual. The three regressions with tenure as a measure of expertise were not significant. Perceived age with both tenure and computer experience was also not significant.

When expertise was measured using computer experience, the interaction of expertise with both chronological age $R^2 = 0.23$, $F(3, 39) = 3.85$, $p < .01$ (see Table 5)

and the interaction with subjective age $R^2 = 0.22$, $F(3, 39) = 3.67$, $p < .02$ (see Table 6) were significant. Specifically, self-efficacy regressed on the interaction of chronological age and computer experience resulted in significant increment in unique variance accounted for beyond the two main effects, $R^2\Delta = 0.14$, $F\Delta\ (1, 39) = 7.18$, $p < .01$.

The significant relationship between the age and computer experience on self-efficacy was probed further using a method advocated by Aiken and West (1991). This would help explain the difference between the two age groups, namely, older and the younger individuals, if one existed. The procedure begins with the significant relationships obtained in regression analysis which are recast as the regression of the criterion on one predictor. Using the following algebraic expression, each regression equation is restructured thus explaining the regression as a Y on X at Z levels.

$$\hat{Y} = (b_1 + b_3Z)X + (b_2Z + b_0)$$

In order to solve this equation several, values of Z should be employed. These values could be from within the full range of Z as it is a continuous variable. Cohen and Cohen (1983, in Aiken & West, 1991) suggest that researchers use the values of Z that correspond to one standard deviation above and below the mean and the mean of the sample when substituting in the equation. The current analysis employed only the high and low values of age to probe the interactions. The next step is to regress these values on the entire model, i.e., the effect of age and computer experience on self-efficacy, which was accomplished for each of the high and low values of the chronological and subjective measures of age. The results are then graphed to illustrate the findings. Figure 2 and 3

show the interaction of computer experience and chronological and subjective ages, respectively, on self-efficacy.

Hypothesis 1 was significant for the chronological and subjective measures of age. We will first explore the measure of chronological age. The interaction between age and expertise in the model predicting the relationship between the high values of chronological age, i.e., older individuals, and computer experience on self-efficacy was significant, $R^2 = 0.14$, $F(3, 39) = 3.85$, $p < .01$, $R^2\Delta = 0.14$, $F\Delta\ (1, 39) = 7.18$, $p < .01$ (see Table 7). Computer experience as a predictor of self-efficacy was also significant in this model, ($\beta = -7.25$, $t(39) = -3.09$, $p < .004$), which indicates that the self-efficacy of older individuals is influenced by the amount of computer experience. Older individuals with experience using a computer tend to view themselves as self-efficacious in the realm of new technologies.

Also, the interaction between age and computer experience in the model predicting the relationship between the low values of chronological age, i.e., younger individuals, and computer experience on self-efficacy was significant, $R^2 = 0.23$, $F(3, 39) = 3.85$, $p < .01$, $R^2\Delta = 0.14$, $F\Delta\ (1, 39) = 7.18$, $p < .01$ (see Table 8). This shows that the self-efficacy of younger individuals is not influenced by the amount of experience they have had with computers. Younger individuals will have self-efficacy for dealing with changes related to technology merely by virtue of the fact that they have been exposed to such changes from a very young age.

As mentioned earlier Hypothesis 1 was significant for the measure of subjective age. The interaction between age and computer experience in the model predicting high

subjective age, i.e., individuals who feel older than they actually are, and computer experience on self-efficacy was significant, $R^2 = 0.22$, $F(3, 39) = 3.67$, $p < .02$, $R^2\Delta = 0.14$, $F\Delta\ (1, 39) = 7.14$, $p < .01$ (see Table 9). This indicates that when individuals felt like they were older than their actual age, self-efficacy did not depend on the amount of experience with computers.

The interaction of age and computer experience on self-efficacy for those low in subjective age, i.e., individuals who felt they were younger than they are, was significant, $R^2 = 0.22$, $F(3, 39) = 3.67$, $p < .02$, $R^2\Delta = 0.14$, $F\Delta\ (1, 39) = 7.14$, $p < .01$ (see Table 10). Computer experience as a predictor was also significant in this model, ($\beta = -.67$, $t(39) = -3.053$, $p < .004$), which demonstrates that the self-efficacy of individuals who feel younger than they actually are is influenced by experience with computers. This indicates that although individuals are old, their experience with computers and the fact that they perceive themselves as being younger than they are, will influence their self-efficacy.

Table 5

Hierarchical Regression Analyses Predicting the Relationship of Chronological Age and Computer Experience on Self-efficacy

	B	ß	t	R^2	F	ΔR^2	F Change
MODEL 1							
Chronological Age	0.11	0.20	1.32				
Computer Experience	-2.36	-0.23	-1.49	0.08	1.84		
MODEL 2							
Chronological Age	0.08	0.14	0.99				
Computer Experience	-3.06	-0.29	-2.05*				
Chronological Age * Computer Experience	-0.43	-0.39	-2.68**	0.23	3.81**	0.14	7.18**

*p < .05
**p < .01

Table 6

Hierarchical Regression Analyses Predicting the Relationship of Subjective Age and Computer Experience on Self-efficacy

	B	ß	t	R^2	F	ΔR^2	F Change
MODEL 1							
Subjective Age	0.25	0.18	1.20				
Computer Experience	-2.31	-0.22	-1.46	0.08	1.69		
MODEL 2							
Subjective Age	0.24	0.17	1.20				
Computer Experience	-2.84	-0.27	-1.91				
Subjective Age* Computer Experience	-1.02	-0.38	-2.7**	0.22	3.67*	0.14	7.14**

*$p < .05$

**$p < .01$

Table 7

Hierarchical Regression Analyses Probing the Interaction between High Chronological Age (CAhigh) and Computer Experience on Self-efficacy

	B	ß	T	R^2	F	ΔR^2	F Change
MODEL 1							
CAhigh	0.11	0.20	1.32				
Computer Experience	-2.36	-0.23	-1.49	0.08	1.84		
MODEL 2							
CAhigh	0.08	0.14	0.99				
Computer Experience	-7.25	-0.69	-3.09**				
CAhigh * Computer Experience	-0.43	-0.61	-2.68**	0.23	3.85**	0.14	7.17**

*p < .05
**p < .01

Table 8

Hierarchical Regression Analyses Probing the Interaction between Low Chronological Age (CAlow) and Computer Experience on Self-efficacy

	B	ß	T	R^2	F	ΔR^2	F Change
MODEL 1							
CAlow	0.11	0.20	1.32				
Computer Experience	-2.36	-0.23	-1.49	0.08	1.84		
MODEL 2							
CAlow	0.08	0.14	0.99				
Computer Experience	1.13	0.11	0.58				
CAlow * Computer Experience	-0.43	-0.51	-2.68**	0.23	3.85**	0.14	7.18**

*p < .05

**p < .01

Table 9

Hierarchical Regression Analyses Probing the Interaction between High Subjective Age (SAhigh) and Computer Experience on Self-efficacy

	B	ß	T	R^2	F	ΔR^2	F Change
MODEL 1							
SAhigh	0.25	0.18	1.20				
Computer Experience	-2.31	-0.22	-1.46	0.08	1.68		
MODEL 2							
SAhigh	0.24	0.17	1.20				
Computer Experience	1.33	0.13	0.66				
SAhigh * Computer Experience	-1.02	-0.51	-2.67**	0.22	3.67*	0.14	7.14**

*p < .05

**p < .01

Table 10

Hierarchical Regression Analyses Probing the Interaction between Low Subjective Age (SAlow) and Computer Experience on Self-efficacy

	B	ß	t	R^2	F	ΔR^2	F Change
MODEL 1							
SAlow	0.25	0.18	1.20				
Computer Experience	-2.31	-0.22	-1.46	0.08	1.68		
MODEL 2							
SAlow	0.24	0.17	1.20				
Computer Experience	-6.99	-0.67	-3.05**				
SAlow * Computer Experience	-1.02	-0.59	-2.67**	0.22	3.67*	0.14	7.14**

*p < .05

**p < .01

Figure 2

Interaction between high and low values of chronological age and computer experience on self-efficacy

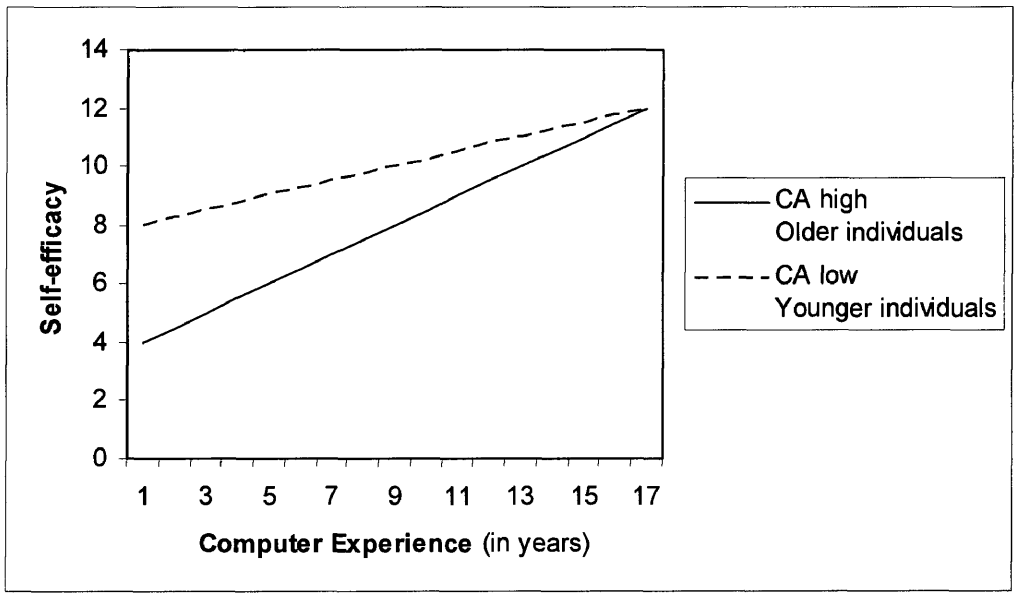
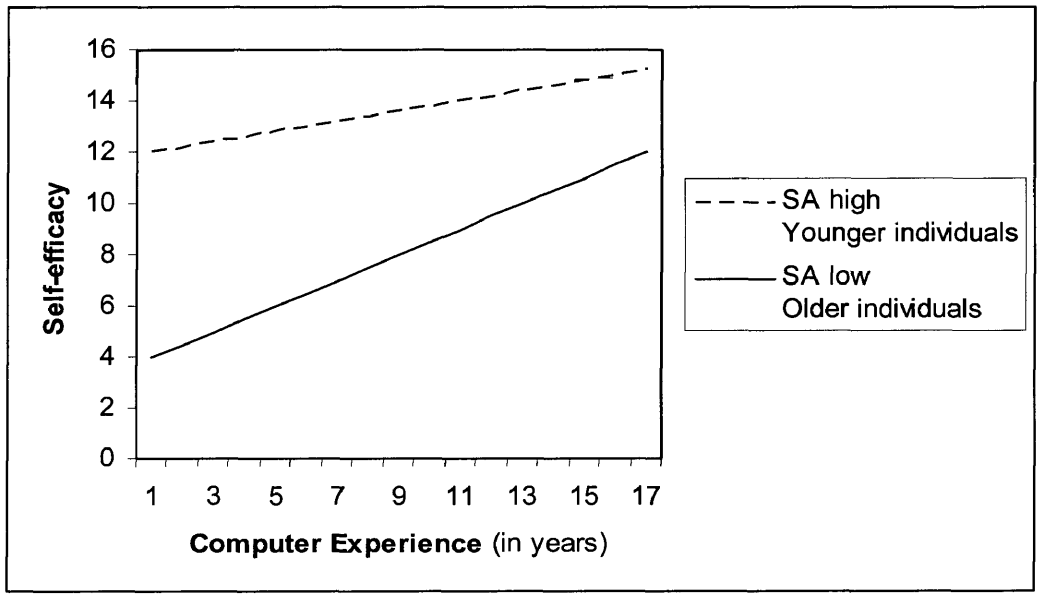


Figure 3

Interaction between high and low values of subjective age and computer experience on self-efficacy



Effect of Age, Expertise and Self-efficacy on Acceptance of Technological Change

As a result of the findings that hypothesis 1 was significant for two out of the three measures of age, and one of the expertise measures, the hierarchical regressions for the second hypothesis were conducted using only those measures found significant in hypothesis 1. Thus, chronological and subjective ages and computer experience were used for subsequent analyses. Hypothesis 2 was assessed using a path-analysis model as advocated by Kenny and Judd (1986). This method of analysis first used hierarchical regressions to test whether self-efficacy had an impact on the relationship of age and acceptance of change, as well as the relationship between expertise and acceptance of change. Similarly, hierarchical regressions were also employed to test whether self-efficacy would mediate the relationship between age and computer experience on acceptance of technological change. One simple regression, to determine if self-efficacy influenced acceptance of change, and two hierarchical regression analyses were conducted. For the hierarchical regressions, the age and the computer experience measures were entered in the first step, the interaction of these two was entered in the second step, and the interaction of the age and computer experience measures with self-efficacy was entered in the third step.

Hypothesis 2 predicted that self-efficacy would mediate the relationship between age, experience and acceptance of technological change. The hierarchical regressions conducted indicated that there was no mediation between the variables. The non-significance of these results can be explained by the possibility of an unmeasured variable which will be discussed in the next section in detail. However, the first step of

the analysis was supported, i.e., the simple regression predicting the relationship between self-efficacy and acceptance of technological change was significant, $R^2 = 0.31$, $F(1, 41) = 18.33$, $p < .0001$ (see Table 11). This shows that self-efficacy does influence acceptance of change. It indicates that when individuals have high self-efficacy for a particular job, they will be accepting of changes that occur within the realm of that job activity.

Exploratory Analyses

When conducting the hierarchical regressions to test for the mediation, it was found that there were 2 3-way interactions that were significant. The first hierarchical regression predicting the relationship between chronological age, computer experience and self-efficacy on acceptance of change was significant, $R^2 = 0.16$, $F(4, 38) = 1.82$, $p < .10$, $R^2\Delta = 0.12$, $F\Delta\ (1, 38) = 5.33$, $p < .02$ (see Table 12). The second hierarchical regression predicting the relationship between subjective age, computer experience and self-efficacy on acceptance of change was also significant, $R^2 = .16$, $F(4, 38) = 1.76$, $p < .10$, $R^2\Delta = 0.10$, $F\Delta\ (1, 38) = 4.61$, $p < .03$ (see Table 13). These findings indicate that there is a relationship between the age, computer experience, self-efficacy and acceptance of change by the individual.

Table 11

Regression Analysis Predicting the Relationship between Self-efficacy and Acceptance of Change

	ß	R^2	F
Self-efficacy	-0.56	0.31	18.33**

*p < .05
**p < .01

Table 12

Hierarchical Regression Analyses Predicting the Relationship between Chronological Age, Computer Experience and Self-efficacy on Acceptance of Change

	B	ß	t	R^2	F	ΔR^2	F Change
MODEL 1							
Chronological Age	-0.01	-0.21	-1.33				
Computer Experience	-0.02	-0.02	-0.10	0.04	0.89		
MODEL 2							
Chronological Age	-0.01	-0.20	-1.28				
Computer Experience	-0.01	-0.01	-0.09				
Chronological Age * Computer Experience	0.001	0.01	0.06	0.04	.59	0	0.003
MODEL 3							
Chronological Age	-0.01	-0.18	-1.16				
Computer Experience	-0.11	-0.11	-0.68				
Chronological Age * Computer Experience	0.01	0.13	0.82				
Chronological Age * Computer Experience * Self-efficacy	0.01	0.38	2.31*	0.16	1.82	0.12	5.33*

*p < .05

**p < .01

Table 13

Hierarchical Regression Analyses Predicting the Relationship between Subjective Age, Computer Experience and Self-efficacy on Acceptance of Change

	B	ß	t	R^2	F	ΔR^2	F Change
MODEL 1							
Subjective Age	-0.03	-0.23	-1.49				
Computer Experience	-0.08	-0.08	-0.12	0.23	1.13		
MODEL 2							
Subjective Age	-0.03	-0.23	-1.46				
Computer Experience	-0.02	-0.02	-0.09				
Subjective Age * Computer Experience	0.01	0.02	0.14	0.23	0.74	0.001	0.02
MODEL 3							
Subjective Age	-0.02	-0.15	-0.99				
Computer Experience	-0.08	-0.08	-0.51				
Subjective Age * Computer Experience	0.02	0.09	0.59				
Subjective Age * Computer Experience * Self-efficacy	0.01	0.34	2.15*	0.39	1.76	0.10	4.61*

*p < .05
**p < .01

Discussion

Overview

The purpose of this study was to investigate the validity of the stereotype that older individuals are less accepting than younger individuals of any kind of technological change at the workplace. The current study proposed to explore the effect that contextual factors such as expertise and self-efficacy have on the relationship between age and acceptance of technological changes among individuals. The first goal of this study was to determine whether age and expertise influenced the self-efficacy of older and younger individuals. The next goal sought to determine if the effects of age and expertise on the acceptance of technological changes were mediated by their influence on self-efficacy. This section will begin by presenting a summary of the findings and interpretations from this study. It will be followed by the implications of the study, methodological limitations and finally by future research questions.

Summary of Results from Predictions

Age, expertise and self-efficacy. The first hypothesis tested the moderation effect of expertise on the relationship between age and self-efficacy, where older individuals would have higher self-efficacy when they had expertise, as compared to those older individual who had lesser expertise. On the other hand, younger individuals would have high self-efficacy, regardless of expertise. The data from this study confirmed this prediction such that older individuals who had computer experience had higher self-efficacy compared to those with lesser computer experience. Also, as predicted, younger individuals had higher self-efficacy regardless of the amount of computer experience.

The data also shows that the number of years on the job, or tenure of the individual, does not have any significant impact on the technology-related self-efficacy of either younger or older individuals. A possible reason for this could be that the job of a faculty member does not typically include computer experience. Tenure merely indicates the number of years an individual has been a faculty member, not necessarily that he/she had any exposure to computers within that time period. Only the amount of computer-specific experience influences self-efficacy among both older and younger individuals.

Recall that there were three measures of age used in this study, chronological, subjective, and perceived ages. Of the three, chronological and subjective ages were found to confirm the first hypothesis. Subjective age refers to how old or young the individuals perceive themselves to be. Thus, individuals who perceive themselves to be younger than they actually are tend to have higher self-efficacy when they have had computer-related experience. It is interesting to note that of the three measures of age only two provided significant results. Perceived age was the only measure of age that did not provide significant results. One plausible explanation for these findings is that the participants were more easily able to compare themselves as being older or younger than their colleagues at work, whereas when determining their subjective age it was relatively simpler for participants to indicate a particular age group to which they thought they belonged. This could be the reason why the measure of perceived age did not generate significant results.

Age, expertise, self-efficacy and acceptance of technological change. The second hypothesis focused on the mediation of self-efficacy on the relationship of age, expertise

and acceptance of change. This builds on the previous hypothesis such that it proposes older individuals who have computer experience will have higher self-efficacy, which will lead to a higher acceptance of technological changes, compared to older individuals who have lower self-efficacy as a result of lesser computer experience. On the other hand, younger individuals will have higher self-efficacy that will lead to a higher acceptance of change. This hypothesis was not found to be significant. However, there was a significant interaction found between the age, computer experience and self-efficacy when regressed on acceptance of change. Further, recall the significant interaction between subjective age and computer experience as well as chronological age and computer experience on self-efficacy, and the significant correlation between self-efficacy and acceptance of change. It is clear that there are other variables that may play an important role in contributing to acceptance of change above and beyond self-efficacy. This signifies the variables do interact to affect the acceptance of technological changes, but they operate through other mechanisms besides self-efficacy.

When considering other mechanisms that may have resulted in the non-significant results of acceptance of technological changes, we need to explore the phenomenon of the unmeasured variable problem in path analysis which was first proposed by James (1980). He suggested that the most likely cause of insignificant results of a path analysis could be one or more unmeasured variables. The problem could be relevant causal variables that may not have been measured. It is possible that there are some variables that affect the acceptance of change and self-efficacy such as openness to experience, self-esteem of the individual, the basis of change – voluntary versus involuntary, and

adequate training to cope with the change, which were not measured in the current study. James (1980) recommends a solution to this problem suggesting that when conducting a path analysis researchers should measure all variables that are causes of the endogenous (dependent) variable and that could be correlated with any other causes of the endogenous variable.

Yet another explanation why these results were not found to be significant could be due to the manner in which the change was brought about among the participants. There is a clear difference between the effects of change that has been imposed on individuals versus collaboratively brought about. Coch and French (1948) suggest that autocratic change usually destroys the "we" attitude and results in a resistance to change by employees. The rationale of the proposed change as well as the clear necessity for the change needs to be made salient if it is to be seen as favorable among employees.

Bennis (1999) in his article on leadership styles states that the traditional top-down leadership model will not prove to be an efficient means of dealing with subordinates in a world engulfed by technological changes. He emphasizes the need for collaborative efforts and teamwork when introducing and adapting to such changes. He suggests that top-down leadership tendency is maladaptive. If employees perceived this change as being forced upon them in an autocratic way, psychological reactance is likely to have occurred. Brehm (1966) defined psychological reactance as "a motivational state directed toward the reestablishment of whatever freedom has been threatened or eliminated" (pp. 703). This reactance translates into employees unwillingness to accept change. This would lead to the conclusion that resistance to change was not due to

perceptions of ability, i.e., self-efficacy, but due to unwillingness to learn or accept change because the introduction of myMAPP among faculty members in the College of Education could have been brought about through a top-down process or what has been termed as dictative change.

Interpretation of Findings

A crucial finding of this study was that when older individuals are experienced in using computers they tend to have higher self-efficacy. Previous research on older individuals has shown various stereotypes associated with that age group. Weinberger and Millham (1975, in Slotterback, 1996) found that people rated older individuals as being less adaptable and less adjusting than younger individuals in similar situations. Similarly, Kite and Johnson (1988) conducted a meta-analysis to examine the age-related attitudes and stereotypes towards older and younger individuals. They found that attitudes toward older persons were more negative than attitudes toward younger persons by approximately one-third of a standard deviation. The findings from this study go against this stereotype thus suggesting that with the right kind of experience, older individuals will have a greater belief in their ability to perform any task within the realm of their experience. With the right training and adequate measures of introducing change these beliefs could also lead to a higher acceptance of any changes that may occur.

In both the younger and the older people, computer experience led to a higher self-efficacy, where the self-efficacy of the individuals with computer experience was higher than that of those without such experience. These findings mirror those in previous studies. Hill, Smith and Mann (1987) found that prior experience with computers is

related to beliefs of efficacy with respect to computers. They posit that experience with computers is likely to increase personal efficacy beliefs with respect to computers.

Another finding of the current study was that among those individuals who have not had experience with computers, younger individuals tended to higher self-efficacy. This could be explained by the fact that younger individuals have been exposed to computers and other kinds of technological advances from an early age, which makes it easy for them to believe they can accomplish any technical tasks. The younger individuals have grown up with different technological advances occurring throughout their life-time and continuing to take place as they grow older.

It was also found that the self-efficacy of the individual had a positive influence on the acceptance of technological changes at the workplace. This is a crucial finding of the study, which indicates that those individuals who have a high self-efficacy to learn and perform technical processes, which ultimately leads to a better acceptance of any changes occurring within that sphere of activity. This is an important finding of the study as it illustrates the basic premise of this study that belief in one's abilities will lead to the acceptance of changes within in that area. Prior research supporting this claim found that computer self-efficacy was a strong predictor of the perceived ease of use of the technology and in turn on the acceptance of the information system (Hasan, 2004). The findings mirror the results found in the current study where the self-efficacy of the individuals was significantly related to the acceptance of change. This implies that when individuals believe they have the necessary skills to perform a task they will be accepting of change in the realm of that job, in the current study, technological change.

The present study found interaction effects for the acceptance of technological change being significantly influenced by the age, computer experience, and self-efficacy of the individual. Although there was no mediation found between the variables, these significant interactions indicate that there is a relationship between the aforementioned variables. Hill, Smith and Mann (1987) showed similar results, where computer efficacy beliefs made a significant contribution to the prediction of behavioral intentions. Specifically they found that the belief one is capable of performing computer-related tasks will influence the likelihood of actual performance of the task, which can be extrapolated to affect the acceptance of any computer-related changes that might occur. Thus, both younger and older individuals who had some experience with computers in the past tended to have a high self-efficacy for the performance of any computer-related tasks, which in turn positively influenced their acceptance of technological change.

Wanberg and Banas (2000) found that increased information and self-efficacy for dealing with the proposed changes were associated with greater change acceptance. This finding was not supported in the present study; however, future research could look at the effects of providing information to individuals and how it impacts their acceptance of change. This could be yet another "unmeasured variable" (James, 1980) that needs to be explored.

Implications

Theoretical implications. The present study found that individuals at any age who have had some experience with computers will have higher self-efficacy to perform technical tasks. Another set of findings was that those individuals who saw themselves as

being younger than they actually are were also had higher self-efficacy to perform technical tasks. Future research should investigate this attitude in individuals to determine how to enable such a view in more individuals thus making them more readily accepting of changes within the organization.

Applied implications. The most important implication of this study is that people should be cautious when making judgments about older individuals in the workplace. The key finding of this study was that when people have had experience with technology, they were willing to accept changes associated with it. This finding implies that even older individuals that one would normally consider resistant to any technological changes in the workplace, will accept changes if they have had some experience within that field. It is therefore essential that we are made aware of this fact and become more sensitive to older workers and not disregard them when it is time to adapt to changes within organizations. Another applied implication of this study is that older individuals should be given equal opportunities for training in new technologies so as to enhance their confidence, self-efficacy and, in turn, acceptance of the changes occurring in the organization.

Limitations and Future Research

The biggest limitation of this study was the limited number of participants. There were a total of 43 respondents to the survey out of a possible 60. Since sample size is one of the main components that affects the power of a study, it is possible to speculate that this could have contributed to the some of the non-significant results found. Future

research should explore similar factors with a larger sample size, in order to overcome any limitations that might have occurred as a result of the restricted sample size.

Previous research has shown that there are a wide range of context-specific as well as individual based differences that could influence the acceptance of change at the workplace. A potential limitation of the present study is that it has explored only two of the context-specific variables, temporarily ignoring the effect of individual-based differences that might have occurred during the time of the study. Future research should explore individual based differences, such as, optimism and self-esteem, that would play a role in altering the manner in which individuals accept changes.

Yet another limitation of the current study could be the explanation for the acceptance of technological changes by younger individuals. The current study explains this acceptance based on an assumption about their familiarity with the various kinds of computer related experiences merely as a function of being exposed to such changes throughout their lives. This speculation should be tested in future studies which could try to delineate the reasons for such an acceptance by younger individuals. Is it purely exposure to technology from a young age that gives rise to these differences, or do some individual-based factors influence the acceptance?

Previous research has found some variables to be indicative of the acceptance of change; thus future research should explore both the contextual as well as individual factors in more detail in real-world settings. Variables such as those measured by the Big Five personality inventory could be contributors to attitudes towards change. Among

them openness to change would possibly have a significant effect on whether people accept changes. Future research studies should explore this factor in particular.

Keeping in mind the unmeasured variables problem proposed by James (1980), future research should investigate variables that could influence the outcomes of the current study. Future research should explore how openness to experience, self-esteem of the individual, the basis of change – voluntary versus involuntary, and adequate training to cope with the change influence both acceptance of technological changes as well as the self-efficacy of individuals.

Conclusion

The study found that when older individuals had experience with computers they tended to have higher self-efficacy. Younger individuals on the other hand had high self-efficacy regardless of the amount of computer experience. These findings imply that older individuals should be given training and exposure to different technologies so as to increase their self-efficacy for performing such technologically related tasks which may possibly lead to an acceptance of technological changes within the organization. Future research should explore the reason why younger individuals have a higher acceptance of technological changes, even with lesser experience, as well as some of the individual-based differences that contribute to acceptance of changes.

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APPENDIX A

Age Measures

Subjective Age (Adapted from Cleveland, Shore & Murphy, 1997)

Please select one of the following 4 alternatives to answer each of the following questions

Alternatives – 25 – 35 years, 36 – 45 years, 46 – 55 years and 56 – 60 years

1. The way you generally feel
2. The way you look or your appearance
3. The age of people whose interests and activities are most like yours
4. The age that you would most like to be if you could chose your age right now

Perceived Relative Age (Adapted from Cleveland, Shore & Murphy, 1997)

Please select one of the following 3 alternatives to answer each of the following questions

Alternatives – Older, Younger and About the same age.

1. Compared to the average age of members of my work group, I FEEL
2. Compared to the average age of members of my work group, I LOOK
3. Compared to the average age of members of my work group, I ACT

APPENDIX B

Computer Experience Questionnaire

(Developed by Dr. Ann Fruhling, 2005)

Please select one option to answer the following questions.

1. How many hours do you spend a week on a computer?

   Less than 3 hours, 3-6 hours, 6 – 9 hours, more than 10 hours

2. How many hours do you spend per week on the internet?

   Less than 3 hours, 3-6 hours, 6 – 9 hours, more than 10 hours

3. How would you rate your general level of computer expertise?

   No experience, Some experience, A lot of experience, Expert

4. How would you rate your general level of internet expertise?

   No experience, Some experience, A lot of experience, Expert

5. Where do you connect to the internet.

   Home, Work, Both home and work

APPENDIX C

Self-efficacy Measures

Personal Efficacy Beliefs Scale

(Adapted from Riggs, Warka, Babasa, Bentacourt & Hooker, 1994)

Think about your ability to do the tasks required by your job. When answering the following questions, answer in reference to your own personal work skills and ability to perform your job.

1. I have confidence in my ability to do my job.
2. There are some tasks required by my job that I cannot do well.
3. When my performance is poor, it is due to my lack of ability.
4. I doubt my ability to do my job.
5. I have all the skills needed to perform my job very well.
6. Most people in my line of work can do this job better than I can.
7. I am an expert at my job.
8. My future in this job is limited because of my lack of skills.
9. I am very proud of my job skills and abilities.
10. I feel threatened when others watch me work.

Change-specific Efficacy

(Adapted from Ashford, 1988)

(answered using a 5-point format ranging from agree to disagree)

1. Wherever the restructuring takes me, I'm sure I can handle it.

2. I get nervous [that] I may not be able to do all that is demanded of me by the restructuring. *

3. I have reason to believe I may not perform well in my job situation following the restructuring. *

4. Though I may need some training, I have little doubt I can perform well following the restructuring.

(Note: * indicates recoding)

APPENDIX D

Acceptance of Change Scale

(Adapted from Oreg, 2003)

(answered using a 5 point scale from Strongly Agree to Strongly Disagree)

1. I'm constantly worried about things after this technology was introduced. *

2. I'm overwhelmed by all the things that need to be done because of this change.*

3. I try not to think about it because when I do I get too stressed out. *

4. I'm excited about this new system.

5. This whole new system of doing things makes me kind of angry. *

6. I don't really think this system is necessary. *

7. Things will be better off after this system has been fully implemented across the university, in comparison with the way things were before.

8. I think it is good that we're going through this change.

9. This change will do us all good.

(Items marked with an * are reverse coded)

APPENDIX E

Email sent to faculty members (participants)

Dear Faculty Member,

I am Cheryl Fernandez, a Ph.D. student in the Industrial-Organizational Psychology program here at UNO in the process of completing my thesis. My thesis is about peoples reactions to technological change. I would like to evaluate your reactions to e-portfolios (myMAPP), a relatively recent change that you have been trained to use. I have received the required IRB approval for the same and the code is 093-06-EX. **I earnestly request you to take a few minutes to fill out this questionnaire.**

There is a link at the end of this email which will take you to the questionnaire that has been timed to take 7 minutes to complete. Your responses will go directly to a secure server which will assign you a random identifier number. As a requirement of the IRB regulations, there will be no information recorded that could be used to trace your responses back to you. I assure 100% anonymity. The only 2 people who will be able to access the raw data will be my advisor Dr. Lisa Scherer and myself.

If you decide to participate in this study and would like to be notified of the results you could reply to the follow-up email I send out after the pre-determined time period has elapsed to complete this questionnaire.

Please feel free to contact me if you encounter any problems or have any concerns or questions.

I would like to thank you for your time and patience.

Thanking you in anticipation.

Cheryl.

LINKS

Please click on this link to complete the questionnaire

Questionnaire (Press the Ctrl key and click this link)

or

you could cut copy and paste the following into the address line of your browser

http://tejas.in/e-portfolios_questionnaire/