Changing Demographics of the Workforce: Implications for the Use of Technology as a Productivity Improvement Strategy

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The increased use of technology as a productivity improvement strategy might or might not be effective because of certain attributes of major components of the changing workforce. This article describes the trends and suggests intervention strategies.

Technological Innovation as a Productivity Improvement Strategy

Technological innovation has long been considered a major strategy for improving public sector productivity (Lovell and others, 1977; Washnis, 1980). Computer technology, for example, appears to have a positive effect on productivity. Kraemer and Danziger (1990), after reviewing literature published since 1985 on the impact of computers on the work life of information workers, conclude that "most of the recent studies agree that computerization has substantially increased the quantity of work output, although few explicitly measure the full costs of providing computing services" (p. 600). They also note that most studies also report that the effects of computerization on the quality of work are generally positive. These findings are reassuring considering the proliferation of computers in organizations. "Estimates are that over two-thirds of the technical, managerial and administrative work force in the U.S. are using computers on their jobs today" (Mirvis, Sales, and Hackett, 1991, p. 113). In an earlier edition of this journal, Epstein and Leidner (1990) describe an explosion in the use of nonmainframe computers in New York City government: "It is estimated that there are more than 10,000 microcomputers and intelligent workstations and perhaps an equal number of terminals attached to minicomputers and word-processing systems currently in use by city agencies. This area of computer use continues to grow rapidly as we enter the 1990s, with a reported 2,000 386 microcomputers purchased by city agencies in the final quarter of the 1990 fiscal year" (p. 211).

This trend is reinforced by the results of a survey of local governments with a population greater than 25,000 in Virginia. Ninety-eight percent of the respondents indicated agreement or strong agreement with the statement, "Your local government will increasingly rely on computers and automated systems by the year 2000" (Wooldridge and Wester, 1991).

But computers are not the only technologies being introduced into the workplace. "Desktop publishers, laser printers, mainframe computers, plain paper fax machines. The . . . world is awash in all kinds of technology designed to get the product or service to the consumer faster, cheaper, and more efficiently" (Pilenzo, 1990, p. 82). Many public organizations at the federal, state, and local levels are using expert systems for decision-making situations where expertise and rule-of-thumb knowledge are crucial (Coursey and Shangraw, 1989). Even sanitation departments are making use of technological innovations. Holzer and Callahan (1993) list the following uses of technology by the sanitation departments of New York City, Phoenix, Arizona, and Scottsdale, Arizona:

> Trucks designed specifically for operation by two [workers], rather than the traditional three-[worker] crew
> Remote-control arms that allow the driver to lift and empty large containers of refuse
> Robotic truck painters, which a management–labor team approached the private sector to design
> Tire-changing machines designed specifically to the agency's standards and intended to alleviate the high degree of manual work in the operations
> Purchase of "high dump" street cleaning brooms, which are faster and safer and can dump refuse into another vehicle
> Redesign of the equipment used to transport refuse from barges to landfills [p. 338]

The increased use of technology in the workplace has significant implications for the knowledge, skills, and abilities of the workforce: "To the extent that [organizations] plan for the workforce implications of new . . . technologies that they introduce, it is often in a largely unconscious manner. . . . [P]erceived wisdom and wishful thinking encourage many managers to believe that new technologies will permit them to get along not only with proportionately *fewer* workers—a perfectly reasonable assumption in many cases—but also with workers who are on average *less skilled*" (Adler, 1992, p. 3).

The fallacy of this belief is reported by Kraemer and Danziger (1990):

> For most information workers, computing expands both the number of different tasks that are part of their job repertoire and the array of skills that they can bring to bear on those tasks. For example, in a study of fourteen diverse organizations, middle managers reported that office automation had enhanced their work. More than 70 % reported that office automation

> had increased the variety of skills they needed on the job, and less than 2 % indicated that the diversity of skills required for their work had decreased (Milliman and Hartwick, 1987). Similarly, less that 15 % of librarians in another study attributed a reduction in skill mix to the use of computing in their work (Hahn et al., 1987). [p. 605]

Work Force 2000 puts these trends in perspective. The report points out that "of all the new jobs that will be created over the 1984–2000 period, more than half will require some education beyond high school, and almost a third will be filled by college graduates" (Johnson and Packer, 1987, p. 97). This is in contrast to the conditions in 1987, when only 22 percent of all occupations required a college degree. These changes will be reflected in the median years of education required by the new jobs, 13.5 compared to the current job requirements of 12.8. The fastest-growing jobs will require much higher math, language, and reasoning capabilities than do current jobs (Johnson and Packer, 1987). This trend toward higher-complexity jobs is even more pronounced in the federal workforce. Johnson (1988) predicts that, during the period 1986–2000, federal jobs requiring higher-level language skills will grow by 94,000, while jobs that can be performed by workers with lower language skills will fall by more than 47,000. Likewise, jobs requiring mathematics skills in algebra, statistics, or trigonometry are forecasted to grow by 64,000 and those that require lower-level skills are expected to decrease by 47,000.

Romei (1990) quotes estimates forecasting that 80 percent of all jobs in the year 2000 will require two years of post–high school education, but that 75 percent of current employees have not attained this level. Both the Johnson and Packer and the Romei studies predict a high demand for skilled employees.

The use of technology to improve productivity in the public sector is increasing significantly. However, this is not the only trend that characterizes public organizations. At the same time that governments are increasing their use of technology, important changes in the workforce are also taking place. In fact, these increases in the complexity of the technological content of work would not be disturbing were it not for evidence that significant portions of the work force *currently* have attributes that are incongruent with the needs of these job content trends. It is important to stress that the predicted incongruences are calculated on the assumption that current attributes of certain subpopulations of the workforce will continue into the future. It is the hope of this author that successful interventions will take place to remove these incongruences.

Demographic Changes in the Workforce

In 1987 the Hudson Institute published *Work Force 2000,* a report that has become an essential reference book for the human resources management community. Among the demographic "facts" that the report says will shape

the economy and the workforce of the future are a continued "feminization" of the workforce (that is, a growing percentage of the workforce that is female), the increasing representation of minorities in the workforce, and the aging of the workforce. Another trend that this report forecasts is a growing gap between the knowledge and skills required to perform adequately on the job and those possessed by a significant portion of the workforce.

Increased Proportion of Women in the Workforce. During the 1980s women accounted for more than 70 percent of growth in the labor market (Friedman, 1987). By the year 2005 women will make up approximately 47.4 percent of the total workforce (Fullerton, 1991).

Increase in the Percentage of Minorities in the Workforce. The growing share of minorities in the labor force has been an important development of the past several decades, and the Bureau of Labor Statistics projects a continuation of this trend. The proportion of white non-Hispanics in the labor force will decline because all the other labor force groups—blacks, Hispanics, Asians, and others—are projected to increase at a faster rate and to represent a larger share of the labor force in 2005. For blacks, this is an expansion from a 10.7 percent share of the labor force in 1990 to 11.8 percent by 2005. For Hispanics, an even faster rise is projected, from a 7.7 percent share in 1990 to 11.1 percent by 2005. The number of Hispanics in the 2005 labor force is projected to approach that of blacks. An important factor in their rapid increase is that a significant share of immigrants to the United States are projected to be of Hispanic origin. The Asian and other groups are projected to increase their share of the labor force from 3.1 percent to 4.3 percent.

Between 1986 and the year 2000, 55 percent of the net addition to the labor force—new hires minus retirees—will be blacks, Hispanics, Asians, and other minorities (Petrini, 1989).

Aging of the Workforce. The 55-and-older population is expected to expand as those born in the 1940s reach this age.

In the years between 1990 and 2005, the number of men in the labor force 55 and over is projected to grow by 3.5 million, or 31 percent, and the number of women of the same age will increase by 3.8 million, or 47 percent. For the same time period the overall labor force is expected to increase by only 21 percent (Fullerton, 1991). By the end of this century, only 39 percent of the workforce will be under age 35, versus 49 percent now. Moreover, the number of people age 50 to 65 will increase at more than twice the rate of the overall population (Ramirez, 1989).

The 39 million workers age 35 to 44 will dominate the labor force at the turn of the century. But the share of workers age 45 to 54 will also rise. Fifty-one percent of the workforce will be between the ages of 35 and 54, and 11 to 13 percent will be over 55. In 1970 the median age of employees was 28; by the year 2000 it will be nearly 40 (Kelly, 1992).

Increase in Workplace Illiteracy. Workplace literacy relates to the required or needed skills of the specific or various employment sectors, types

of industry, or jobs and employment. Workforce or workplace illiteracy refers essentially to the absence of those skills, abilities, and attitudes (Ford, 1992). Workplace literacy means interpreting work schedules, following written instructions, and giving clear and succinct directions to others. It is explaining a complex operation to a new employee; it is taking ideas apart and putting them together again. This is the form of literacy that employers are most concerned about, because of its direct connection to work, quality, and job performance (Ford, 1992).

Poor literacy costs the nation an estimated $25 billion to $30 billion every year in lost productivity, errors, and accidents. A recent study has found that nearly half of the nation's 191 million adults are not proficient enough in English to write a letter about a billing error or to calculate the length of a bus trip from a published schedule (Celis, 1993). One out of every five adults in this country cannot read this sentence (Yaffe, 1992). Moreover, literacy among the 21- to 25-year-olds is dropping (Kaplan, 1993). The Department of Education estimates that some 27 million American adults read at or below the fourth-grade level. These people are considered functionally illiterate (Bruening, 1989). Adding to that another 45 million marginally literate people, whose skills measure up only to the eighth-grade level, yields a total of 72 million people who read below the eighth-grade level in this country (Price, 1989).

The U.S. Department of Education estimates that the functionally illiterate now account for 30 percent of the unskilled, 29 percent of the semiskilled, and 11 percent of the managerial, professional, and technical workforce. Illiteracy is increasing by 2.3 million people per year (Lee, 1992).

Unequal Distribution of Workplace Illiteracy. It has already been pointed out that two of the fastest-growing segments of the workforce in the twenty-first century will be blacks and Hispanics. The juxtaposition of the increases in these segments of the population to the increased skill requirements of the future workplace is significant. The Educational Testing Service runs the National Assessment of Educational Progress, referred to as the NAEP. NAEP surveyed 3,600 individuals in the 21- to 25-year-old age group and found, for example, that only 60 percent of whites, 40 percent of Hispanics, and 25 percent of blacks could find information in a news article, and as few as 25 percent of whites, 7 percent of Hispanics, and 3 percent of blacks could follow directions to travel from one location to another using a bus schedule.

Technological Ethnic/Racial/Gender Gap and Differences in Expectations

"The world of technology has traditionally been a male world" (Gutek and Bikson, 1985, p. 123). "Anecdotal evidence abounds concerning the extent to which the world of technology is a male world. Video game arcades are populated almost exclusively by males; the few females in evidence are

usually spectators. Voluntary participation in computer camps and classes involves the predominance of males over females in ratios that are reported variously as 3:1, 4:1, even 9:1. Visits to computer rooms and centers in coeducational middle schools, high schools, and colleges reveal a preponderance of males" (Wilder, Mackie, and Cooper, 1985, p. 215).

As late as 1974, engineering, the occupational field most responsible for developing and implementing technology, was chosen by less than 1 percent of women (Sherrei, 1979, as quoted in Gutek and Bikson, 1985). There are few women using computers, and where they do they use computers for different work-related activities. "Women tend to be highly represented in word processing, secretarial, and data entry positions, whereas men have jobs in science, math, engineering, and supervisory positions and use computers in those fields" (Banks and Ackerman, 1990, p. 75). Canada and Brusca (1991, p. 43) define the term *technological gender gap* as "the idea that males and females have different technology-related attitudes, behaviors, and skills." They review literature that describes gender stereotyping of computers, access and experience with computers, and gender differences in the types of computer applications used. They conclude that enough differences exist that female students are at risk for missing out on the skills and knowledge that are prerequisites for success in an increasingly technological educational setting. It must be pointed out, however, that another recent study has been more optimistic. "These findings . . . should also reassure those who are concerned that the introduction of microcomputers in the workplace has imposed disproportionately negative impacts on female employees" (Norris, 1992, p. 70).

One study, however, suggests that women are more pessimistic than men as to their expectations of the effects of implementing new technology in their workplace. Women did not anticipate as much improvement as did men and had lower expectations about the benefits of the technology (Hackett, Mirvis, and Sales, 1991). Expectations are important; research suggests that the successful implementation of proposed innovations depends on the fit between the characteristics of the innovation and the perceptions of the employees.

Computer-related activities are seen not only as male but as male and white (Badagliacco, 1990). Snyder (1988, as reported in Badagliacco, 1990) points out that in the United States in 1984–85, 37 percent of all undergraduate degrees in computer and information sciences were awarded to women, only 5 percent were awarded to blacks, and only 2 percent to Hispanics. At the graduate level, only 28 percent of master's degrees and 14 percent of the doctorates were awarded to women, while less than 2.5 percent of all graduate degrees in these disciplines were awarded to either blacks or Hispanics.

It has been suggested that an individual's experience with a technological innovation will influence his or her attitude toward it (Ostberg, 1980, as reported in Gattiken, Gutek, and Berger, 1988). To the degree that this hypothesis is valid, again two of the subject groups are negatively affected. In a study

of the gender/racial/ethnic attitudes and experiences vis-à-vis computers, there was a statistically significant difference between the average years of prior computer experience of those females who wanted to study computer applications (2.47 years) and those of males with a similar desire (3.61). The same study showed that Hispanics had the fewest number of years of experience. (Interestingly enough, blacks had the highest average number of years of experience). The author of this study concludes as follows: "For the present, we need to be aware that we may be in danger of creating a 'technological underclass.' Females and certain nonwhites do not have highly favorable attitudes towards computers, and do not have as much experience with computers" (Badagliacco, 1990, p. 59).

Incongruent Cognitive Styles

Cognitive styles are "information processing habits representing the learner's typical mode of perceiving, thinking, problem solving, and remembering" (Keefe, 1979, p. 4). One of the most fundamental of all cognitive style dimensions appears to be the concept of field independence-dependence (Claxton and Murrell, 1987). In a field-dependent (FD) mode of perceiving, perception is strongly dominated by the overall organization of the surrounding field, and parts of the field are experienced as "fused." In a field-independent (FI) mode of perceiving, parts of the field are experienced as discrete from the organized ground. Witkin, Oltmann, Raskin, and Karp (1971, p. 28) say that "what is basically at issue in this (FD) cognitive style is the extent of ability to overcome an embedding context. It may therefore be designated as a global-vs.-analytical dimension of cognitive functioning." Scores from any test of field dependence form a continuous distribution. As the name implies, persons who by various assessment means are labeled field-dependent/global learners rely upon the environment of the learning situation for structure. FDs are sensitive to social cues (without being alerted to them). They are interpersonally oriented and rely heavily on external stimuli. This motivates them to look toward others for reinforcement of opinions and attitudes. Their reliance on the external referent also endows them with a tendency to change after interaction with others. Field-dependent persons like to be with people, show an interest in others, are sociable, and tend to be better liked than field-independent people. They appear to have developed a repertoire of interpersonal behaviors that search out social cues. They appear to prefer to be physically close to people and to be emotionally open. FDs exhibit more personal warmth and demonstrate a greater ability to have harmonious relationships than FIs. Thus they can be said to have an interpersonal orientation to life.

The field independent/analytical learner does not rely on the learning environment for referents. FIs have an internal structure that enables them to analyze information and solve problems without outside assistance. These individuals' repertoires of interpersonal behaviors are not as well developed as

those of the FDs, and they appear to prefer social distance. They are not as well liked as FDs, are not as sensitive to socially oriented communication, and, without being previously warned, do not pay as much attention to others around them. The FIs do not seek reinforcement from others as they make decisions and appear to have a more well-developed self-concept. In addition, FIs appear to be more active, autonomous, self-motivated, and task-oriented in their approaches to life. These individuals have the ability to analyze information from the learning situation and solve problems independently. The analytically oriented learners resist distractions that would adversely affect their educational experience and have a longer attention span and greater reflectivity than global learners. They tend to be more sedentary and prefer formal learning situations, viewing the instructor merely as a source of information. They are competitive, achievement oriented, and impersonal.

A common instrument for measuring this construct is the Group Embedded Figure Test (GEFT). Subjects are asked to locate a previously seen simple figure embedded within a larger, more complex figure. "The test is scored on the basis of the total number of simple forms correctly traced. Scores may range from zero to eighteen" (MacNeil, 1980, p. 355). Persons with lower scores are said to be field-dependent. Field-independent individuals have scores approaching 18. MacNeil reviewed much of the relevant research on this topic and concluded that researchers assumed that the cutoff point between FIs and FDs is somewhere between 12 and 13 (MacNeil, 1980).

Studies have shown that field independence significantly influences student performance in microcomputer courses (Howard, 1990) and reading efficiency (Ellis, 1988).

Unfortunately, field independence is not equally distributed across all population groups. Females (Allen and Cholet, 1979; Witkin and Goodenough, 1981; Ellis, 1988; Wooldridge, 1993), blacks (Ellis, 1988; Hale-Benson, 1982; Hainer, 1987; Wooldridge, 1993), and Hispanics (Bermudez, 1986; Ramirez and Price-Williams, 1976; Ramirez and Castaneda, 1974) are found to be significantly more field dependent than are Asian or white male Americans. However, after reviewing the literature for significant sex differences in this cognitive-style concept, Allen and Cholet (1979) estimated that gender accounts for less than 15 percent of the variance in field-dependence scores.

It would appear that, if previous research is correct, the cognitive learning styles that characterize females, blacks, and Hispanics would put them at a disadvantage in a work environment that features an increased use of technology.

Implications for Public Managers

This paper has identified several trends that the author suggests are incongruent with the increasing use of technology to promote productivity improvement in public organizations. These demographic trends include a gender/

racial/ethnic technology gap, incongruency in cognitive styles, growing and unevenly distributed workplace illiteracy (especially important because of the increasing number of women, blacks, and Hispanics in the workforce), and the aging of the workforce.

This suggested mismatch between the demands of an increasingly complex technological workplace and the attributes of groups that form the fastest-growing portions of the workforce of the twenty-first century has many possible causes and consequences, and thus the corrective actions that are available to public managers are necessarily as varied. A few of these actions will be suggested below.

Responding to Workplace Illiteracy. "In an increasingly competitive and technology-oriented world, the pool of employees who are qualified—even by historical standards, much less by those of the future—will be shrinking instead of growing" ("Changing Nature of Work," 1992, p. 66). It is well recognized that to meet the needs of the changing workplace, employers must make significant investments in human capital—in the training of their employees. They will have to invest heavily in expanded, continuous educational and training programs for all employees.

Studies conducted by the Society for Human Resource Management have found that successful workplace literacy programs share the following characteristics:

> Basic skills training is packaged as part of a broad training agenda which encourages participation.
> Employees' personal goals are solicited and included in program planning.
> Instructors are aware of basic skills needed to perform the specific job tasks for which they are providing training.
> Program goals and standards for measuring progress are clearly specified; pretests and post-tests simulate job situations and tasks.
> Learning materials are directly related to the goals.
> Feedback is frequent and progress is documented.
> Where possible, incentives such as the opportunity to learn new technology are provided to qualify employees for new job openings, or to meet personal goals.
> Training is scheduled wholly or partially on company time to encourage attendance. [Pilenzo, 1990, p. 84]

Pilenzo goes on to say that it is extremely important for the organization to show commitment to the educational program and respect for the employee.

Responding to the Gender/Racial/Ethnic Technology Gap. There are no simple answers to the gender/racial/ethnic technology gap problem. This author is forced to resort to selecting findings from a variety of research on various subpopulations and "patching" together a solution to be generalized over the subpopulations of females, blacks, and Hispanics. For example, Gutek and Bikson (1985) found that at the high school and college levels of education, a "larger percentage of men at each of these educational levels hold upper level

jobs than do women with comparable educational preparation" (p. 126). Women report lower levels of autonomy on the job (Gutek and Bikson, 1985). These same researchers concluded that information technology is associated with more advantages for men than for women.

Canada and Brusca (1991) make recommendations to educators for overcoming the technological gender gap. Following is an adaptation of these recommendations to public sector management; the recommendations are generalized to the black and Hispanic workforce as well.

Adopt a proactive stance. Canada and Brusca point out that without intervention males and females demonstrate different computer-related attitudes and behaviors. "There is also evidence that when educators assume a proactive stance towards ensuring gender-equitable computer opportunities, the gap narrows" (p. 46). I would suggest that public managers should require computer and other technological training of all employees in appropriate job categories and monitor to ensure the participation of women, blacks, and Hispanics.

Structure the physical and social environment of computer facilities to enhance learning opportunities for females and those of relevant minority groups. The different learning styles and preferred learning environments of women, blacks, and Hispanics have been discussed and will be elaborated upon in the next section.

Integrate computer work and programming skills across the curriculum. I would modify this recommendation to be applicable to the public manager by recommending that employers seek "targets of opportunity" in all employee responsibilities for the utilization of computer applications.

Eliminate sexist, racial, and ethnic stereotyping and stereotypic themes from computer software and training applications. Training software should reflect topics and examples that would be of interest to females, blacks, and Hispanics. Professional applications, obviously, should be free of any negative stereotyping. "The introduction of technology can serve as a catalyst for change, or it can rigidly reinforce the status quo in an organization" (Gutek and Bikson, 1985, p. 135). The proactive public manager must ensure that technology serves as a positive catalyst for change. Badagliacco (1990) states that "we must ensure equal computing opportunities for women and minorities, and support the creation of special programs that target women and minorities for participation in high technology education" (p. 59).

Responding to the Incongruency of Cognitive Style and Use of Technology. Strategies available to public managers for modifying the cognitive styles of employees are somewhat limited. One important aspect of cognitive styles is stability. Without intervention, most cognitive styles tend to be consistent for individuals across a variety of tasks for long periods of time (Ausburn and Ausburn, 1978). There is also evidence that field dependence may be established fairly early in life. For example, test scores for boys at age 10 were substantially correlated with retest scores at ages 14, 17, and 24 (Witkin and Goodenough, 1981, p. 68). It has been suggested that, after the mid thirties, individuals tend

to become slightly more field dependent. However, relative to one's peer groups, cognitive style tends to remain stable over time. Thus the degree of field dependence/independence in early adulthood can be predicted with some accuracy from measurement of this cognitive style at a much earlier time.

However, Witkin and Goodenough (1981) do review research that suggests that certain types of training (including watching "Sesame Street," although this is not recommended as a strategy for public employees) can influence field dependence. Ausburn and Ausburn (1978) suggest an interesting modification to training design when the manager is confronted with possible incongruences between the cognitive style of the employee and abilities required by certain tasks. "When such incompatibilities occur, the learner requires assistance if they are to generate correct solutions for a task. What clearly is needed is an instructional design that will assist the learner in making the necessary transformations" (p. 343). These authors suggest two types of "supplantation"—conciliatory and compensatory. Conciliatory supplantation involves the learner's using his or her preferred cognitive style to acquire the information needed to carry out the previously incompatible task. For example, for an extremely field-dependent employee, needed computer-related abilities might be best transferred in a discussion or small-group format instead of straight lecture or video presentation. The compensatory supplantation involves providing employees with the specific cognitive environment that they cannot provide themselves. For an extremely field-independent worker, management might assign tasks that specifically call for the worker to note and respond adequately to cues from other workers or customers.

Each of these two cognitive styles has advantages and disadvantages. The disadvantages can be minimized if individuals are not "fixed" with regard to their use of the characteristics associated with that style. Individuals who have access to characteristics associated with both field-dependent and field-independent styles would be referred to as "mobile" (Witkin and Goodenough, 1981). Mobile cognitive styles would appear to be an important asset in the work environment of the future.

Responding to the Aging of the Workforce. The literature records many myths concerning older workers that when analyzed appear unfounded. The following paragraphs list some of the myths that relate to the older worker's relationship to technological innovation:

Myth: Older workers are more prone to accidents. Older workers make up about 13.6 percent of the labor force and account for only 9.7 percent of the injuries. They do take longer to recover than their younger counterparts (Hale, 1990).

Myth: Older workers cannot or do not want to learn new skills. Research on older workers' desire and ability to learn new skills as summarized by Sawyer (1993) indicates that people who are capable of learning when they are young, and who continue to use their intellectual abilities, maintain these

abilities in later life (Humple, 1983). Furthermore, there is considerable evidence that older people are interested in lifetime learning to quite advanced ages and make excellent students (Shea, 1991). They are trainable and retrainable and continue to learn and develop their vocabularies and powers of judgment throughout their lives. Most suffer no marked creative or intellectual decline (Gilsdorf, 1992). There is evidence that they do learn differently from when they were younger. The brain can take longer to store and retrieve data, which can slow down the learning process, but when older workers learn new tasks, they tend to perform them with fewer mistakes than their younger counterparts (Fyock, 1990). "The ability of older adults to learn and benefit from training and education at all points in the life span is increasingly emphasized in the current adult-learning literature" (Sterns, 1987, p. 22).

"In contrast to the myth about older workers being reluctant to engage in training, the Travelers found in a survey in the late 1980s that 65 percent of retirees queried who had at least typing skills had also expressed an interest in learning to use a computer" (Hale, 1990, p. 57). According to Karen Quitt, program coordinator for New Directions (funded by the Private Industry Council in Portland, Oregon), one reason for the success of this program's computer training is that it starts with the basics. "She says many programs fail in teaching older adults . . . because the instructors assume a skill and knowledge level that just doesn't exist with many adults" (Fyock, 1990, p. 109).

It does appear true that sometimes the older worker is reluctant to volunteer for or to pursue training opportunities. "This reluctance may be due to feelings of inadequacy about being able to do well in a training program, fear of failure, fear of competition with younger individuals, or the expectation that supervisors would encourage them if they felt it was appropriate" (Sterns, 1987, p. 22). Also, according to Knowles (1973), older workers may lack confidence in their ability to master a new technology. Therefore, "it seems likely that training approaches that integrate mechanisms for building confidence with training content may be superior to training approaches that only focus on training content" (Gist, Rosen, and Schwoerer, 1988).

Myth: Older workers are inflexible and less creative. A person's ability to handle change is related to how well he or she handles stress, and this is not age related. The older worker may tend to be more of a traditionalist and not grab at the new, but this can have a balancing effect in the organization (Sawyer, 1993).

The American Association of Retired Persons (1988) offers several suggestions for managing older workers. These principles are basic good management strategies and follow from what researchers have identified in motivation theory. They include identifying the real needs of the older worker, which might include financial security, social interaction, and making a contribution. Once these needs have been identified, managers must

show that good job performance will be directly related to to the satisfaction of one or more of those needs.

Managers need to work with the older worker to set measurable, challenging, but realistic goals. Obviously the older worker must have the means and opportunities to achieve the goals. Once the goals have been met, the employee must be recognized and rewarded as appropriate given the level of achievement. Older workers also need their jobs enriched. Management must provide the older worker with a change of pace, additional autonomy, or new responsibilities.

With careful consideration by management of these principles, and with effective training support, a successful integration can be achieved between the older worker and the technology required to improve public sector productivity.

Conclusion

This paper has illustrated the tensions that might exist between the need for public organizations to implement new technologies designed to improve productivity and the attributes of growing segments of the diverse future workforce. These tensions need not be dysfunctional if public sector managers are sensitive to the differences brought by each subpopulation of the new workforce to the workplace. Public sector managers need to keep abreast of effective strategies for responding adequately to these differences.

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