## Technological Change and Industrial Relations

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Change, by definition, alters the status quo and disrupts established patterns of behavior and relationships. Change is particularly disturbing if it occurs rapidly — so that those affected must adjust quickly — and if it affects employment, for the workplace provides not only economic security but also a sense of self-worth and a nexus of social interactions. Today, due to both rapid and sweeping change in the workplace, life feels complex and unsettling. We are living in the midst of an information technology upheaval, and we feel ourselves becoming absorbed into a complex network that defies description, cannot be contained by borders or firewalls, and seems to have limitless possibilities for innovation, diffusion, and disruption. Modern technologies are both exhilarating and frightening, bringing problems along with great promise.

This symposium on technological change in the workplace captures the good and the bad, presenting the current situation (which can change almost instantly) and sometimes speculating about an uncertain future for which the skills of a science fiction writer might be better employed than those of a labor relations academician. Five scholars agreed to tackle this challenging topic in this first symposium on technological change. (A second symposium will focus on the impact of technological change in the traditional heavily unionized sectors such as construction, mining, and railways.)

The symposium opens with Poster's provocative article "Workers as Cyborgs." He argues that networked computing alters the very essence of human labor in ways that cannot be articulated clearly but are discerned at a more instinctual level. For example, cyberspace exists as a work venue, but most humans do not have the capacity to understand it or enter it in any meaningful way. We simply have sensory limitations that prevent us from following the high speed microworld of the computer. Furthermore, the contested terrain of the worksite, with its power relations and interpersonal rivalries, has moved into the world of information technologies. Companies struggle to find technologies that limit the expression of dissent among workers but increasingly companies acknowledge that they cannot constrain the astonishing capacity of the web to act as the repository of human expressions. Poster discusses the fascinating consequence of computer technologies: Workers have lost their artisanal "touch" and now work "cognitively rather than sensually." Certainly a keyboard is more antiseptic than a pen, and a voice recognition program is not a conversation. But Poster goes beyond this simple point, arguing that the digital economy organizes production around the partnership of humans with information machines. The future of this partnership is unknown. As he puts it, "cultural change of this sort is difficult, disorienting, and confusing." In this thoughtful postmodern perspective on computer technologies, Poster supplies us with the key insights fueling this discourse on the future of labor in the networked age.

The technology picture is not bleak and murky in Budd's article on the role of technology among industrial relations academics. Here, technology has been harnessed to improve the quality of teaching. Budd examines innovative uses of new technologies that enhance the experiences of students and their relationship to the teaching material. Budd has first-hand experience, for he created the Zinnia collective bargaining exercise, available on the Internet, and it was a breathtaking advance over the conventional pen-and-paper simulations that were workmanlike but dispirited and flat. The Zinnia conveys a rich fantasy-world that approximates real-life messiness. Budd discusses many other widely available techniques that could easily become learning-sweeteners to a new generation well-versed in computer use. Indeed, there are generational issues at work in the classroom, frequently with students far ahead of their teachers in their familiarity with sophisticated new technologies. There has been a democratization of information. The hard-won pearls of wisdom gleaned by professors after many years of book-based learning is now widely available to students.

The challenge for educators is how to reconfigure their professorial toolbox to help students make their way through the mass of materials that students draw on rather indiscriminately. Professors help students discern quality and meaning within the information that threatens to swamp the neophytes in any field. What makes Budd's article so appealing is his advocacy for using technologies as a complement to (rather than substitute for) effective teaching. Technology can allow the flourishing of a new form of craftsmanship. Budd also makes a gesture which is at once a service to academics and also an example of how to use technology to blaze a new trail for the *Journal of Labor Research:* He creates a website with live links to all the materials he discusses in his article. He walks the talk.

Firms within the trucking industry have adopted technological change as part of a dramatic struggle for survival. Belzer carefully documents the effects of the removal of economic regulation and the extremely tight margins that developed in trucking companies. Technological innovations were essential to meet the challenges of intense competition. The new technologies have not always had positive results: The performance pressures on drivers and dockworkers have intensified while their real wages have decreased. Belzer reports on a study conducted from 1997 to 1999 that included 14 carriers and more than 2,000 questions. He begins by analyzing the institutional features of the trucking industry and the changes affecting it over the past few decades. His data demonstrate that mechanical changes have been incremental and widespread, in contrast to information technology advances that have been more revolutionary but not as widely adopted. Belzer raises important questions about the effects of technological change on the lives and working conditions of those employed in the trucking industry. He asks "Who has this technology benefited?" His research concludes that drivers do not benefit. They work harder and longer, and despite the improvements to crash-avoidance technology, there remain concerns about road safety. Belzer reminds us that while technology undoubtedly is a major factor in the trucking industry, the importance of industrial relations solutions remain front and center.

Schumacher undertakes the ambitious task of trying to isolate and measure the effects of technological change in American health care labor markets. This task is quite daunting since the environmental factors characterizing the industry were far from stable. Technological advances coincided with the emergence of a managed-care dominated market and new statutory and legal approaches to collective rights among health care workers. Moreover, the measurement of technological change is difficult, and Schumacher provides a brief discussion of two different methods used in health care research. One method constructs a "technology index," and the other uses a hazard model to trace the diffusion of a specific high-tech innovation. Schumacher then analyzes changes in health care employment based on the monthly outgoing rotation group files from the Current Population Survey in the U.S. from 1983 to 1999. Included in the survey are variables such as wages and union coverage. Schumacher finds that dramatic wage gains in portions of the industry have accrued to the more highly skilled workers. The hypothesis that Schumacher develops and tests is that there is a skillbiased technological change that leads to demonstrable returns to measurable skills (using proxy variables of education and experience). He speculates that this will likely continue, with hospitals and other service providers emphasizing the skills workers bring to the job.

Conventional wisdom holds that technological change can lead to improved efficiencies in the administration of record-keeping functions. Turning to the area of employee pensions and benefits, Nielson describes these and other, perhaps more significant, impacts of technologies. On the "plus" side of the technology ledger, it is becoming easier to respond to employee needs. Human resource departments can more easily design and administer questionnaires asking for employee preferences. Perhaps the trend towards cafeteria-style benefits was facilitated by technological change. Employees can use the new technologies to bypass what once was the exclusive domain of the personnel department — if a worker wakes up in the middle of the night fretting about a dental bill or a pension payout, the insomniac can log onto a company Intranet website and, armed with a password, can access the necessary information. Information is timely, more accurate, and more attuned to individual employee needs.

The field of benefits administration is changing, requiring more knowledge of information systems and how to adapt technological advances to meet corporate and workplace needs. Advances in data management systems facilitate the compilation and manipulation of vast amounts of information. This capacity may generate solutions to a pressing public policy issue around pension portability for an increasingly mobile work force. To paraphrase Andrew Sims (head of a Canadian federal task force on labor law reform), if companies can track airline points to gain marketing advantage, why can't we solve the more serious pension portability issues? Nielson also raises and discusses the less beneficial outcomes of using online systems for benefits administration, including serious concerns with data security.

In summary, this symposium opens with a sweeping analysis of the relationship between labor and technology. Poster raises our awareness of the issues and gives us both useful and perplexing insights. The following four articles describe in some depth industries or occupations affected by technological change — industrial relations academics, trucking, health care, and benefits administration. All are being transformed by some technologies that were unimaginable in our youth (and we don't feel all that old). Particularly in the realm of information technologies, the rates of innovation and diffusion are astonishing. Though we still drive conventional gasoline-powered cars broadly similar to those owned by our parents, by contrast, on are desks are pieces of equipment with the power that could have run the Pentagon or taken us to the moon. And it is ironic that the vast majority of us still have only a vague understanding of how computers work.