Backgrounder

Skill and Employment Effects of Computer Based Technologies

The ongoing spread of computer-based technologies over the past two decades is resulting in fundamental changes in the nature of work. *The Working With Technology Survey III (WWTS III*) provides evidence that the more widespread use of computers in the workplace is affecting both the occupational composition of employment and the skill requirements of jobs. The WWTS III collected information from a sample of 263 business establishments in Canada on the introduction and use of computer-based technologies over the 1992-94 period and on the occupational and skill impacts of those technologies.

The survey was conducted twice previously, in 1985 and 1991. It has documented the ongoing spread of computer use across Canadian business establishments and the increasing intensity of use within establishments since the early 1980s. Early applications consisted largely of the introduction of stand-alone technologies, creating "islands" of automation. By the late 1980s, computer use had begun to shift to include higher proportions of data and communications networks. In the earlier period, the greatest skill impacts were felt by clerical and secretarial workers; by the end of the decade, large impacts were felt by managerial and professional/technical employees.

The intensity of computer use has increased steadily through time, rising from an establishment mean of 16 per cent of employees working with computers in 1985, to 37 per cent in 1991, to 43 per cent in 1994. A process of skills upgrading within business establishments is occurring as a result of this intensification of computer use.

Skills upgrading is evident in two ways. The first is in terms of occupational upgrading. The Working with Technology Survey asked respondents to identify any job-types that were either created or eliminated when computer-based technologies were put in place (including new, expanded and upgraded applications).

Distinct patterns characterize the patterns of job-type creation and elimination (Figure 1). Professional positions accounted for over half of the jobs that were created but for only 7 per cent of those that were eliminated. That stands in sharp contrast to the situation for intermediate skill job-types, which accounted for 60 per cent of the job-types that were eliminated, but for only 11 per cent of those that were created. With respect to occupation type, positions in the natural and applied sciences and engineering accounted for the great majority of positions created, with most of these consisting of positions for computer professional, technical, and managerial workers. In contrast, just over half of the job-types that were eliminated consisted of clerical occupations, predominantly those requiring general office skills, office equipment operators, and finance and insurance clerks.

Figure 1: Jobs Created and Eliminated, 1992-1994, WWTS III

(Percentage Distribution)
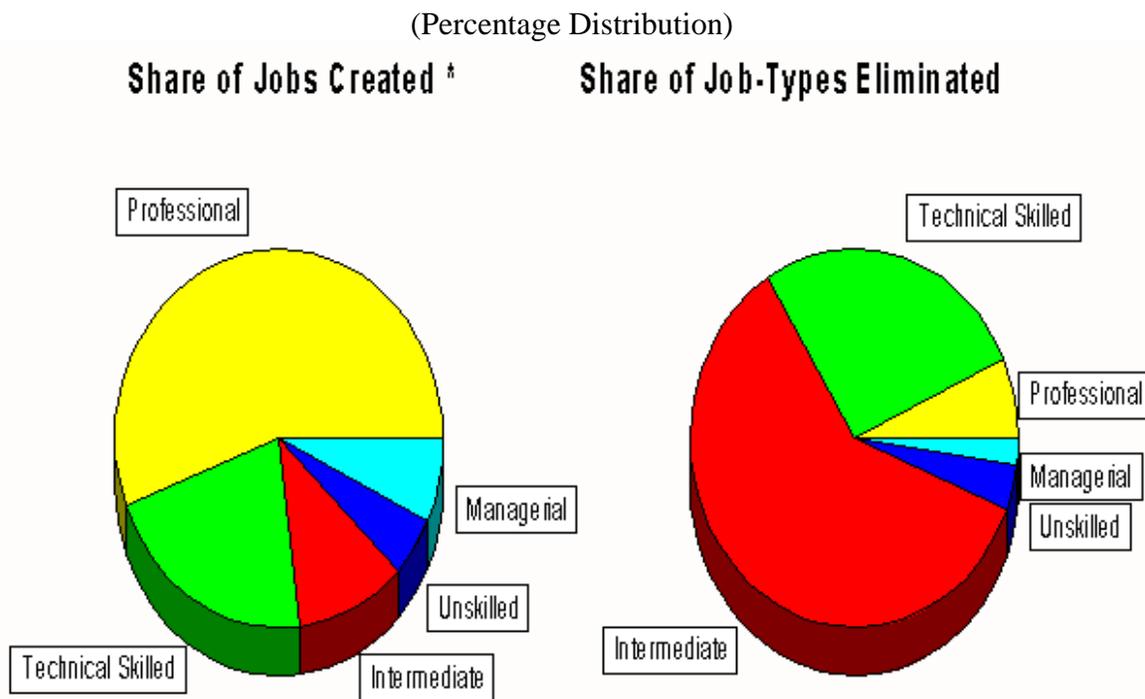
* Weighted by number of jobs created

Upskillling is evident within jobs as well. Respondents to the Working with Technology Survey provided estimates of the extent to which skills were changing on three dimensions know-how, problem-solving and autonomy. While all skill levels saw increases in skill requirements on all three dimensions, the increases were greatest for skills relating to technical know-how for professional and skilled technical workers. Intermediate-level and unskilled workers also experienced some increase in skill requirements relating to problem-solving, which is consistent with the movement down the corporate hierarchy of decision-making responsibility.

Both effects the shift to higher-skilled occupations and increases in skill requirements were most pronounced in establishments that ranked high in terms of intensity of computer use.

While the majority of respondents reported providing training when putting computer-based technologies in place, the training tended to focus on software applications and skilled technical employees. Other adjustment measures include hiring, employee transfers, and out-sourcing/contracting out. Establishments experiencing large increases in skill requirements relating to know-how tended to use both hiring and employee transfers as a means of adjustment more than establishments reporting little change on this skill dimension.

A key conclusion is that the on-going deepening of use of computer-based technologies within organizations is resulting in a transformation of the skills structure and in a widespread process of upskilling of jobs through both an occupational shift to high-skill jobs and an increase in skill requirements, especially for know-how, that is evident across the occupational spectrum. As a result, employment opportunities are disappearing for intermediate and unskilled workers in many sectors, notably those that are intensive users of computer-based technologies. Further, unskilled workers are not being provided with the skills to move into the newly-created positions. When introducing or expanding computer systems, employers focus on up-grading the skills of technical workers.

That means the labour market will have to continue to absorb displaced workers who lack the skills and qualifications needed in a computer-based economy. For many , that will mean a shift to other industry sectors that continue to employ large percentages of low-skill, and often, low-wage, workers. But the Working with Technology Survey evidence suggests that even many of these jobs may disappear as traditionally low-wage sectors move toward greater use of computers in the workplace. To definitively answer that question, a larger survey that is representative of the full industrial, regional, and size composition of Canadian business is needed.

Last, in order to be able to compete for "good" jobs, individuals need to be equipped with strong computer skills. For many, that means that literacy, numeracy, and communication skills must be strengthened first.

 (1996)