

**Participation in Employer-sponsored
Training in Canada:
Role of Firm Characteristics and Worker Attributes**

by

**Kuan Xu
Dalhousie University**

**Zhengxi Lin
Human Resources and Skills Development Canada**

Working Paper No. 2007-03

March 2007



DEPARTMENT OF ECONOMICS

DALHOUSIE UNIVERSITY
HALIFAX, NOVA SCOTIA, CANADA
B3H 3J5

Participation in Employer-sponsored Training in Canada:
Role of Firm Characteristics and Worker Attributes*

Kuan Xu
Department of Economics
Dalhousie University
Halifax, Canada
B3H 3J5
Email: kuan.xu@dal.ca

Zhengxi Lin
Policy Research and Coordination
Human Resources and Skills Development Canada
Place du Portage Phase IV
140 Promenade du Portage, 3rd Floor
Gatineau, Quebec
K1A 0J9
Email: zhengxi.lin@hrsdcc.gc.ca

* Views expressed herein are those of the authors and as such, do not necessarily reflect those of the authors' affiliations. We wish to thank André Léonard for helpful comments on a previous draft. We would also like to thank Arden Bell, Neil Buckley, Sai Choi Chua, Lucy Chung, James Chowhan, Heather Hobson, Emmanuelle Pierard, and Phyllis Ross for informatics support. We are solely responsible for any errors remaining.

Summary

Using data extracted from the Adult Education and Training Survey (AETS) and the Workplace and Employee Survey (WES) of Statistics Canada, this paper empirically investigates employee attributes and employer characteristics that are associated with the participation of employer-sponsored training in Canada. We add to the literature in a number of ways. First, we employ data for a 12-year period (1991 to 2002), offering a trend analysis and assessing the changing impacts of explanatory variables, compared to analysis of training participation in one particular point in time usually seen in the literature. Secondly, we use two data sources, one household survey and one linked employer-employee survey, compared to the use of one data source commonly found in the literature. Our results, to a large extent, complement each other where applicable. Thirdly and most importantly, the literature rarely examines the impacts of employer characteristics and worker attributes jointly. That is exactly what we attempt to achieve in this paper.

Our findings not only confirm some of the hypotheses raised in the theory of human capital but also provide some important policy implications. Market forces such as increasing competition, research and development, technological innovation and the resultant skill requirements provide external driving forces for employer-sponsored training. Firm management practices such as the amount and availability of training are important internal forces affecting employer-sponsored training. But existing market forces and management practices appear to still leave some imbalances in employer-sponsored training. More specifically, some industries, small firms, and blue-collar workers all have lower training participation rates. Hence in these areas, public policies may play an important role in encouraging and promoting training.

Participation in Employer-sponsored Training in Canada: Role of Firm Characteristics and Worker Attributes

1. Introduction

In order to be successful in the highly innovative and globally competitive knowledge-based global economy, Canada must produce, attract, renew and upgrade the well-educated labour force. In addition to training new graduates and attract skilled immigrants, renewing and upgrading skills of the existing labour force remain one of the most challenging and important tasks. The employer-sponsored training in Canada has been falling short of international standards (Government of Canada 2002a:59) but is increasingly demanded across industries (Government of Canada 2002b:41). This is of particular importance considering the Canadian ageing population and smaller future cohorts of new workers entering the labour force in the years and decades to come.

In this context, Lin and Tremblay (2003) identify some knowledge gaps in the participation and duration of employer-sponsored training in Canada with reference to firm characteristics and worker attributes. Specifically, many studies have examined the relationship between worker attributes and participation in employer-sponsored training, but few studies have examined the role of firm characteristics and even fewer studies have considered the effects of both sets of factors jointly. The availability of the Workplace and Employee Survey (WES) enables us to do just that.

Our objective is to address the issue of how employer-supported training is affected by various firm characteristics and worker attributes jointly, as called for in Lin and Tremblay (2003). This paper tackles training participation while a companion paper (Xu and Lin 2005) deals with issues related to training durations.

We add to the literature in a number of ways. First, the literature usually focuses on training participation in one particular point in time (year). In contrast, we employ data for a 12-year period (1991 to 2002), offering a trend analysis and assessing the changing impacts of explanatory variables. Secondly, the literature usually uses one data source. In comparison, we use two data sources, one household survey (the AETS) and one linked employer-employee survey (the WES). Our results, to a large extent, complement each other where applicable. Thirdly and most importantly, the literature rarely examines the impacts of employer characteristics and worker attributes jointly (except Turcotte, Leonard and Montmarquette 2003). That is exactly what we attempt to achieve in this paper.

The remainder of the paper proceeds as the following. Section 2 briefly reviews the existing literatures so as to outline a framework suitable to empirically investigate the determinants of training participation by jointly examining the role of worker attributes and firm characteristics. Section 3 briefly describes our data sources and highlights some stylized facts about participation in employer-sponsored training, followed by the presentation and discussion of our empirical results in Section 4. Finally, Section 5 concludes the study with some implications and future work.

2. Determinants of Employer-supported Training: What do we know?

There are three broad research areas on adult education and training: (a) the labour economics literature, a branch of economics overarching labour related issues, economic or non-economic; (b) the education literature, sometimes mingled with sociology; and (c) the human resource literature, considered as a special field of business studies. These broad research areas provide a fertile ground for studying employer-sponsored training. We briefly review these literatures in turn, starting with the labour economic literature.

2.1 Labour Economics and Training

Economists often think of the rationale of providing for or participating in training in terms of human capital. According to Rosen (1987), the economic literature treats human capital as “the productive capacities of human beings as income producing agents in the economy”. Schultz (1971: vi) attributes the idea that education should be viewed as investment in human capital to several earlier distinguished economists Adam Smith, H. von Thünen, and notably Irving Fisher although Alfred Marshall appeared to disapprove the idea of naming the human’s productive capacities as a form of capital. The concept of human capital, nevertheless, becomes widely used in economics in the last twenty five years primarily due to the pioneering work of Becker (1964), Mincer (1972), and Schultz (1970). While Schultz emphasizes more on general schooling, Becker and Mincer pay more attention to job-related training, which becomes a more prominent focus in economic growth and competitiveness (see Helpman 2004).¹

It is generally agreed that there are three interdependent main components of human capital --- early ability (whether acquired or innate); qualifications and knowledge acquired through formal education; and skills, competencies and expertise acquired through training on the job, all of which are essential for the productive capacities. While general education may be helpful in acquiring general skills, each firm requires additional skill sets which depend on different types of work. Hence, Backer (1964) points out the need to distinguish training activities for general skills from those that are firm-specific.

Becker (1975) puts forward the concept of general training that enhances an individual’s productivity to many employers and the concept of firm-specific training that is only relevant to the specific firm where this individual is working. These two forms of training may not be

¹ Mincer (1962, 1974, 1983, 1988, and 1994) is also a pioneer in the area of the on-the-job training. In particular, he notes that the employment experience can be a useful proxy for human capital, much of on-the-job training is technology-induced, and economic growth is fostered by investment in human capital.

separated easily in practice. Stevens (1994) notes that the two forms of training do not encompass all types of training in the context of imperfect competition between firms in the labour market. However, the provision and utilization of employer-supported training are dependent on the decisions of both employers and employees in question. Economists view these decisions as rational choices. Becker suggests that individuals and firms invest in training when the discounted expected benefits outweigh the discounted expected costs. Contrarily, if the discounted expected benefits are less than the discounted expected costs, individuals and firms will not invest in training. It is possible that firms consider job-related training beneficial and hence offer training but individual employees may or may not participate, or that individual employees believe job-related training beneficial but firms may or may not offer it. Observed data on training, job-related or not, employer-supported or not, represent and can help us to understand choices made by employers and employees jointly.

The economic literature recognizes the necessity for the firm to offer or sponsor job-related training. Jovanovic (1979) notes that job-matching difficulties lead to higher turnover. Barron, Black, and Loewenstein (1989) show that it is the process of job matching in a heterogeneous labour market that explains the necessity of job-related training. Stevens (1994) addresses the complication due to labour market imperfections and division of training benefits between firms and workers. Loewenstein and Spletzer (1998) analyze how firms and workers share both costs and returns to general training and how general training financed by previous employers increase wage rates more than that financed by current employers. Acemoglu and Pischke (1998), Acemoglu and Pischke (1999a), and Acemoglu and Pischke (1999b) find that theories on training under the perfect labour market cannot explain different employer-sponsored training practices in various countries. Firms provide general training in addition to specific

training, and employees including those with minimum wages finance their own general training. Acemoglu and Pischke (1999c) note that the compressed wage structure may motivate firms to finance general training. According to Audor (2001), training can help firms to attract higher ability workers and lower wages after training. However, Bresnahan, Brynjolfsson, and Hitt (2002) note that information technology, complementary workplace reorganization, and new products and services constitute a significant skill-biased technical change affecting labor demand and hence, employer-sponsored training. Acemoglu and Pischke (2002) recognize that it is the rents that firms get via their monopsony that motivates general training for workers. Díaz-Vázquez and Snower (2003) propose a theory showing employer-sponsored training will influence firing costs for the firm. In a slightly different context, Markusen and Rutherford (2004) find that well-trained imported, and otherwise, expertise is important to firms.

The existing literature documents the fact that employer-sponsorship may help the employees' involvement in job-related training. This is supported by Altonji and Spletzer (1991), Hui and Smith (2004), and Lillard and Tan (1992). But the evidence is not strong in Barron et al. (1987) and Lynch (1992).

The existing empirical studies have noted that employer-sponsored training, both incidence and duration, can be affected by a number of employee and firm characteristics. These include region (provinces and metro centres), age, gender, marital status, presence of young preschool children, schooling/education, job status, occupation, job tenure, industry, firm size, union membership, and income. These employee and firm characteristics are evaluated in the existing empirical studies. More specifically, Blinder and Weiss (1976) and Weiss (1986), Polachek and Siebert (1993) note that when a person gets old he or she will rake less benefit from investment and hence will stop investing in human capital. Heckman and Smith (1999) find

that adult women in the US obtain less training. Greenhalgh and Stewart (1987) find that the presence of children affects the participation of job-related training in the UK. Holtman and Idson (1991) find that marital status in the US is a significant factor. OECD (2003) shows that in 2000 adults with high education attainment participate in more adult education than those with lower education attainment among the studied OECD countries with the exception of Portugal where adults with middle education attainment have the highest participation rate. Lillard and Tan (1992) and Turcotte et al. (2002) find that patterns of training vary across industries in the US and Canada, respectively.² Mincer (1989) and OECD (2003) also find that employer-sponsored training becomes increasingly important as an economy becomes more knowledge-based. Hui and Smith (2004) find that white collar workers tend to get more training in general. Simpson (1984) and Bishop (1991) find that employees with longer job tenure receive more training although Hui and Smith (2004) find that weaker evidence for this hypothesis exists for Canada. Barron, Black and Loewenstein (1987) and Holtmann and Idson (1991) show negative firm size effect for the US and Simpson (1984), Jennings (1996), Lin and Tremblay (2003), and Hui and Smith (2004) find the same effect for Canada. Mincer (1983) finds that union membership reduces training incidence in the US but Lynch (1992) and Lillard and Tan (1992) find that U.S. union workers are more likely to participate in apprenticeship and on-the-job training than their non-union counterparts. Dustmann and Schönberg (2004) find that union members receive more on-the-job training in Germany. While Simpson (1984) finds that union membership does not affect training incidence and durations in Canada, Hui and Smith (2004) find that Canadian union members have lower training incidence and that no patterns can be deciphered in terms of training duration. Lillard and Tan (1992) find that the disadvantaged groups such as low income, non-white and part-time workers have lower training incidence.

² For details see the summary provided in Lin and Tremblay (2003).

2.2 Training in the Education Literature

Different from the labour economics literature, the education literature tends to view training as motivated by individuals inherently pursuing for betterment and self-improving within a constantly changing society including firms where workers are working. Education is viewed as being instrumental not only to the employability of learners but also to broader societal and cultural aspects. Employer-sponsored training and firms play their roles in this larger context. Xiao and Tsang (2001) suggest that adult education, according to Tuijnman (1996:611-19), should be “defined as enclosing a broad scope of planned learning activities with the conscious intention of bringing about changes in knowledge, skills and attitudes”, “Adult education programs are offered to meet a number of development needs, such as vocational or occupationally-related training, civic/political/community competence, remedial basic literacy, knowledge and skills in health, welfare, and family life, as well as self-fulfillment needs. They are provided and sponsored by different types of institutions”.

In particular, the liberal school of thoughts on adult education views adult education as an instrument to increase the capacity of those disadvantaged social groups. This school emphasizes the voluntary nature of participation in adult education (see Linderman 1961 and Houle 1961). However, Blaxter and Tight (1995) find that voluntary participation cannot explain adult education and hence this argument cannot explain why it happens. The other school of thoughts on adult education resorts to economic analysis and represents a utilitarian view of adult education. More specifically, this school focuses on human resource development for organization competitiveness in the modern economy. Training, often with job-related content, is provided by the employer to employees. It is defined to have a narrow and specific purpose with weight of authority given over to the trainer (see Barrie and Pace 1998: 44-48). In this regard,

government programs are often available to those disadvantaged social groups. Both LaLonde (1995) and Friedlander, Greenberg and Robins (1997) believe that we got what we paid for, a modest result reflecting a small investment. They also note that public training programs in the US are not all equally successful.

One of the important lessons learned from this education literature is that it is essential to learn the cognitive motivation, either for betterment or economic advancement, of learning in the workplace environment and beyond. Most recent studies have investigated individual characteristics such as region, age, gender, presence of preschool young children, education, job status, job tenure, firm size, industry and income. But little has been said about the individual motivation and cognitive belief about the amount of training, availability of training, and skill requirement. In this study, we will consider these omitted dimensions. The advantage of combining the AETS and WES datasets is that these datasets permit us to examine these dimensions of employer-sponsored training.

2.3 Human Resource Development and Training

The third relevant literature is the human resource literature.³ This literature on employer-sponsored training is multi-dimensional. Employer-sponsored training often serves the purpose of employee orientation, compliance, skill updating, new technology and procedure, organization structure change, employee personal growth and employee loyalty.

In Canada, it is found that a technological change induces more employer-sponsored training, in particular at smaller firms; that better trained workers tend to get more employer-sponsored training when employed; and that employer-sponsored training often enhances job

³ The human resource function at the firm/organization management level handles staffing, compensation, job analysis, performance appraisal, education programs, training and development, industry organization, employee behaviour and related legal matters. Evidently, training and development forms an integral part of the human resource function.

satisfaction of workers (Anonymous 2001). Way and Thacker (2001) note that the majority of Canadian firms do not have a necessary level of technical human resource management. Reid and Adams (2001) find that most of family businesses in the United Kingdom provide less employer-sponsored training than their non-family counterparts.

One of the major lessons from the human resource literature is that without examining the human resource practice, technological innovation, organizational changes, and competition, we may not appreciate how employer-sponsored training is determined. But these are too often gravely omitted.

This study attempts to fill this gap. Our empirical work in Section 4 attempts to integrate implications from the three literatures mentioned above.

3. Employer-sponsored Training Participation: Some Stylized Facts

3.1 Data Sources: AETS and WES

Empirical analysis in the study uses data extracted from the Workplace and Employee Survey (WES) and the public-use microdata files of the Adult Education and Training Survey (AETS) of Statistics Canada. The AETS was conducted in 1992, 1994, 1998 and 2003. For each of the respective previous year, these surveys collect detailed data on the skill development efforts of the entire Canadian adult population and provide information about the main subjects of training activities, their provider, duration and the sources and types of support for training. They also contain a wealth of information on respondents' personal and socio-economic characteristics. In addition, they identify barriers faced by individuals who wish to take some form of training but cannot.

The AETS was administrated as a supplement to the Labour Force Survey (LFS). The content and questions of the AETS have been modified over time. The salient changes are listed

in Appendix Table 1. For example, the target population changed from Canadians aged 17+ for 1992/94/98 to Canadians aged 25+ for 2003. The 1992-1998 AETS track multiple training activities while the 2003 AETS the dominating activity only. The 2003 AETS have questions measuring training motivation and outcomes more accurately than the earlier AETS.

The WES is a linked employer-employee survey. It has two target populations, the employer and employee. The employer population is all business locations in Canada with paid employees. The employee population is derived from the Canada Customs and Revenue Agency T-4 supplementary forms of employees working in the selected business locations. Details of the WES are listed in Appendix Table 2.

The AETS excludes full-time residents of institutions (e.g., the armed forces, correctional facilities, health-care institutions). The WES excludes private households, religious organizations, employers in public administration and in crop production, animal production, fishing, hunting and trapping. The exclusion of Nunavut, Yukon and Northwest Territories is common to both surveys.

The use of the AETS and WES offers a couple of advantages over the existing literature. First off, rather than looking at one particular point in time, our analysis covers the period from 1991 to 2002. We perform a trend analysis and assess changes in the determinants of employer-sponsored training over this time period. Secondly, we link employee attributes to employer characteristics to examine the effect of both sets of variables jointly. In particular, we are able to examine the impact of specific factors more related to the knowledge-based economy such as technology use and increasing skills requirements, innovation, modern work organization, new human resources management practices. The AETS alone suffers the limitation of lack of information on employer characteristics, which is complemented by the use of the WES.

3.2 Variable Selection

The AETS records various training activities primarily in the form of training programs and courses. The key variable of training incidence is derived from the information on multiple training programs, course and activities. Details of main explanatory variables from the AETS are itemized in Appendix Table 3. These include sampling weight, labour force status, training status, training participation/provision, province, metropolitan area, age, gender, marital status, presence of young preschool children, education attainment, job status, class of worker, industry, occupation, job tenure, firm size, union membership, and income.

In addition, the AETS provides information for non-participation for those who “wanted to participate but did not participate.” Furthermore, the AETS provides reasons for non-participation in desired training activities such as the lack of incentive and sense of need, lack of resources in terms of time, money and other employer support (time off), lack of languages or other prerequisites, inconvenient time and location, health, and family responsibility. Understanding the direct measures of reasons for being unwilling/unable to participate in employer-sponsored training can illustrate more insight.

In the WES, job-related training comes with two different forms: classroom training and on-the-job training. The WES contains not only the employee characteristics such as age, gender, marital status, presence of young preschool children, education attainment and so on, but also information on workplace characteristics, particularly on technological changes, innovation, organization changes, human resources practices and competition, as mentioned above. The list of variables from the WES is given in Appendix Table 4.

3.3 Employer-sponsored Training: Trends and Patterns

For the country as a whole, employed-sponsored training participation was 27.9% in 1991, dropped to 26.8% in 1993 and further 25.8% in 1997, but rose to 36.7% in 2002 (the AETS, Table 1).⁴ The participation rate was 54.8% and 53.8% for all job-related training in 1999 and 2001, respectively (the WES, Table 2). The gaps between the AETS and WES are largely caused by the account for on-the-job training in the WES.

Provincial variations were remarkable. The participation rates in 1991 were substantially lower in Atlantic Canada and Quebec than those in the western other provinces.⁵ By 2002, three noticeable trends emerged. First, Atlantic provinces improved markedly with participation rates close to or higher than the national level. Secondly, British Columbia continued its high participation rate. Thirdly, Quebec continued its lower participation rate over the years than most other provinces. The WES data also show that Quebec had the lowest participation rates.

Age and education have been two important factors associated with training participation. Generally, workers under 45 had much higher participation rates than their older counterparts. There has been a linearly positive association between education and training, i.e., the higher the education, the higher the participation. This is true for all years under study and from both data sources.

Full-time workers have consistently had higher participation rates compared to part-time workers. The self-employed had substantially lower participation than wage and salary employees over the years. Of the paid employee population, those worked in the public sector generally had noticeably higher participation than those in the private sector.

⁴ The 2002 participation rate may have been slightly affected by the change in the AETS target population.

⁵ Newfoundland at 26.8%, Prince Edward Island at 21.5%, New Brunswick at 22.9%, Nova Scotia at 24.7%, and Quebec at 24.0%. Alberta had the highest rate at 35.6%, followed by Manitoba at 31.7%, British Columbia at 30.3%, and Saskatchewan at 28.3%.

Industrial and occupational variations have been substantial. Industries with consistent higher participation rates are public administration, community service, and financial services while those with lower participation rates are agriculture and construction.⁶ The WES shows higher participation in (1) finance and insurance and (2) communication and other utility. The lowest participation was found in labour intensive tertiary manufacturing.⁷

White-collar workers had consistently higher rates of participation than blue-collar workers. In the WES data, professionals had the highest participation rate while managers had the second highest. The production workers, on the other hand, consistently had a lower participation rate.

According to the AETS data, employees with shorter job tenure appeared to have less training than those with longer job tenure in 1991, 1993, and 1997 but the gap has been substantially narrowed in 2002. This is confirmed by the WES data for 1999 and 2001.

Participation rates increased with the size of employers. That is, the larger the firm size is, the more likely its employees participate in training. This is as true from the AETS as from the WES. For example, employees with large firms (500+ employees) were observed with a participation rate of 43.9% in 2002, compared to that of 26.7% for employees with small employers (under 20).

Both AETS and WES data show that union members participated more in employer-sponsored training.

Higher-income groups had higher participation rates throughout the entire period. But the gap narrowed significantly in 2002. The lowest-income earners more than doubled their

⁶ The personal service is an interesting case. It had a lower rate in 1991, 1993, and 1997 in the order of 8-10% but it reached 32% in 2001.

⁷ The classification of industries in the WES is somewhat different from that of the AETS.

participation rate from about 13% in 1991 to over 28% in 2002. Evidence from the WES also confirms this finding.

The focal point of this research is the participation/provision decision of employer-sponsored training activities. In making participation decisions, employees consider a number of factors including general attitude towards learning, the availability of training opportunities, perceived benefits expected from training, and direct/indirect costs. Similarly, in making the provision decision, firms evaluate costs and benefits. A host of factors can influence the cost-benefit considerations. We have thus far looked at employee attributes and some firm characteristics available from both the AETS and WES. The following results concern certain employer characteristics that are available only from the WES.

Training is positively associated with skill requirements. Workers with firms that have increased skill requirements had much higher participation rates than their counterparts with firms whose skills requirements have stayed the same or decreased (at 64%, 44% and 34% in 2001, respectively).

Training is positively associated with organizational changes. Workers with firms that have undergone organizational changes had higher participation rates than their counterparts with firms that did not implement these changes. These changes are considered being related to the knowledge-based economy and take various forms, ranging from greater integration, reduction in managerial level, greater inter-firm in R&D collaboration, to re-engineering, adoption of flexible working hours (see Table 2).

Firms' adoption of new computers appears to be associated with higher training participation. However, adoption of other new technologies appears not to affect the participation rates much.

Competition is positively associated with training. Employees who worked at firms competing with firms beyond local markets or with internationally-owned firms had higher training rates. Similarly, employees with firms that recognized the importance of these two types of competition had higher participation rates.

3.4 Barriers to training participation

Among all reasons listed for non-participation in desired training, all factors appear to play some role.⁸ However, there are three dominant barriers: “too busy”, “could not afford or too expensive/no money”, and “family responsibilities”.

As shown in Table 3, time constraint has consistently been an important barrier to training participation. Among those who wanted training but did not participate, the percentage of employees who were “too busy” to participate in training dropped to under 30% in 2002 from 40-58% in earlier years. But this was not because employees were less busy in 2002. Rather, a new question “conflict with work schedule” was added in the survey questionnaire and this reason accounted for about 25% of employees who did not participate in training. The combination of being “too busy” with “conflict with work schedule” accounts for over half of those wanted training but did not participate in 2002.

The lack of financial resources and/or employer support constitutes another important barrier to training. The percentage of employees who cited “couldn’t afford costs/too expensive/no money” has been increasing over the years. When examining the percentage of employees who mentioned “lack of employer support”, the data show that this was a major reason for non-participation in 1993 and 1997 but not in 2002 (this question was not asked in 1991). It appears that employer support (can include both financial and non-financial) has vastly improved but employees still feel the financial pressure for obtaining wanted training.

⁸ These reasons are not exclusive of one another.

Family responsibilities are increasing challenges for employees to obtain training. In the 1990s, about 13% of employees cited “family responsibilities” as a barrier to training. But this number increased to about 24% in 2002. Even if “family responsibilities” are combined with “lack of child care”, “family responsibilities” still constitutes an increasing challenge: the percentage of workers who wanted training but did not participate due to this reason was about 13% in 1991, 17% in 1993, 20% in 1997, and 24% in 2002.

To recap, the AETS data show that participation in employer-sponsored training increased from 28% in 1991 to 37% in 2002. Participation rates from the WES data are much higher due to on-the-job training being accounted for in the WES but not in the AETS. Furthermore, both data sources demonstrate that both worker attributes and firm characteristics are important factors influencing training participation. On the worker side, these are mainly age, education, how one works (being self-employed vs being on wages and salaries; full-time vs part-time), and how much one earns. Where one lives (province) and one works (industry) also makes big differences. On the employer side, these include how big the firm is, whether the firm’s skill requirements have increased, whether the firm has implemented organizational changes that are more related to the knowledge-based economy, whether the firm has adopted new computer technologies, and what kind of competitive environments the firm finds itself in.⁹

However informative they may be, these findings are obtained by examining each characteristic in isolation. That is, impacts on training participation of employee and employer characteristics are not considered jointly. To do this, we turn to econometric modelling now.

⁹ As noted above, most firm characteristics are only available in the WES.

4. Employer-sponsored Training Participation: Determinants

4.1 Model and Variable Specification

Determinants of worker participation in employer-sponsored training are what we are interested in here. Since participation decision can be characterized by a binary variable (taking the value of 1 if a worker has participated and the value of 0 otherwise), we can use the logit model to analyze how participation are determined. The advantage of logit model over its alternative, the probit model, is that the former permits straightforward interpretation of marginal effects of explanatory variables in terms of odd ratios.

The common explanatory variables for both the AETS and WES are province, metropolitan centre, age, gender, marital status, presence of young pre-school children, education, job status (full- vs part-time) status, class of worker (self-employed vs paid employee), industry, occupation, job tenure, firm size, union status, and income. The WES data provide additional employer characteristics. These include the degree of technological complexity, subjective evaluation of amount of training, subjective evaluation of availability of training, skill requirements, human resource practices, various forms of organization change, type of innovation, competitive environments (see Appendix Tables 3 and 4).

4.2 Empirical Results and Discussion

Estimated results for the final specification are presented in Table 3 for the AETS and Table 4 for the WES. Due to non-linearity between estimated coefficients and probabilities, we report estimated odds ratios to assess marginal effects of the corresponding explanatory variables.¹⁰ We proceed with our discussion of these results combining both sets of estimates.

¹⁰ Interpretation of an odds ratio is referred to the control (baseline) category. When the odds ratio is equal to 1, there is no impact from the change in the associated explanatory variable. When the odds ratio is greater (less) than 1, the impact from the change in the associated explanatory variable is positive (negative); the more the value of the odds ratio deviates from 1, the greater its impact is in magnitude.

4.2a Effects of Worker Attributes

Regional differences were substantial in earlier years but disappeared by the last year for which data are available. The AETS results show that Atlantic Canada, Quebec and Ontario all had much lower training participation than western provinces in 1991. However, they have caught up throughout the 1990s and by 2002, provincial differences completely disappeared. The WES adds information on a series of employer characteristics and the results demonstrate similar patterns for 2001.

Age plays a significant role in determining training participation. Both the AETS and WES results show that age has consistently been negatively associated with training participation for most years. That is, the older the worker is, the less likely he/she participates in employer-sponsored training. This is not surprising as older workers have fewer years remaining in their working life and returns to training are expected to decrease with age from both the employer and worker perspectives.

Gender has been a factor in influencing training participation in the 1990s but not in the 2000s. Compared to their comparable male counterparts, female workers have been more likely to participate in employer-sponsored training throughout the 1990s. This gender differences no longer existed by 2002. Marital status and presence of preschool child(ren) have not demonstrated a consistent impact on training participation. They had a marginal impact only for some but not all years.

The role of education appears to be somewhat different in the AETS and WES. In the former, those with schooling of under 13 years had a lower likelihood of participating employer-sponsored training while in the latter, those with an education of university or above had a lower

participation rate. This may be explained by that the WES covers both job-related courses and on-the-job training while the AETS covers only courses and programs.

In most cases, full-time workers had a higher marginal probability to be involved in employer-sponsored training. Compared to paid workers in the public sector, all other types of workers had a lower probability of training participation in 1991. But this difference disappeared in 1993 and onwards.¹¹

Table 8 uses public administration as the baseline case. In the AETS data, almost all other industries had a lower marginal probability of participation. Over the years, construction and personal services had shown the persistent lower marginal probability of participation. On the other hand, Finance had the highest marginal probability, quite close to the baseline case. However, Table 9 employs natural resources as the baseline case as the WES does not cover the public sector. Relative to this baseline case, labour-intensive tertiary manufacturing had the lowest marginal probability while finance and insurance had the highest marginal probability.

Both the AETS and WES show that white-collar workers (including managers, professionals, technical/trades people) had a higher marginal probability to participate in employer-sponsored training. The impact of job tenure has not been consistent over time, highly varying in the AETS but insignificant in the WES. Union membership has not been a consistent factor influencing training participation either.

The AETS shows that workers with lower income were less likely to be involved in employer-sponsored training all else being equal. But the WES shows that wage was neutral in influencing training participation. One possible explanation may be that income is a proxy for many unmeasured variables that are not available in the AETS. The WES provides not only a more precise wage measure but also more information on employer characteristics.

¹¹ The WES does not cover the self-employed.

4.2b Effects of Firm Attributes

Both the AETS and WES show that training incidence positively increases with the size of firms. This has been consistent over the years. This is in line with nearly all findings in the empirical literature. The likelihood of training participation is also positively associated with firms' technological complexity, availability of training, skills requirements, and adoption of new computer technologies.

Training participation is also associated with a series of organizational changes. Most noticeably, the organizational changes that positively affect training participation are more research and development (R&D), total quality control, and less management levels.

Certain types of competition also affect training participation. More specifically, recognizing competition pressures from international firms motivated firms to train more in both 1999 and 2001.

5. Summary and Concluding Remarks

Using the AETS and WES, this paper has empirically investigated the role of both worker attributes and firm characteristics in influencing participation in employer-supported training jointly. It has also examined the impacts of these variables over time. Our results demonstrate that Atlantic Canada and Quebec had lower training participation rates in earlier years. By 2002, however, these provinces caught up with Western Canada and the vast regional differences in training participation disappeared.

Age has consistently been negatively associated with training participation. Full-time workers have consistently had higher training rates. Income has been positively associated with training incidence. Industry and occupation also influences training participation. Effects of other

worker attributes such as education, gender, marital status, presence of preschool child(ren), union membership, have been inconsistent over time.

Important employer characteristics that influence training participation include firm size, complexity of technology, skills requirements, research and development activities, and international competition. Specifically, smaller firms are observed with lower training rates. More complex technology and higher skill requirements are associated with higher training participation. More research and development activities and international competition pressures are also associated with high training participation rates.

These findings are generally in line with earlier work and confirm some of the hypotheses raised in the theory of human capital. They also provide some lessons to public policy makers. Market forces such as competitive pressures, complexity of technology, innovations, and skills requirement provide external driving forces for employer-sponsored training. Firm management practices such as research and development, reduction in management levels are important internal forces affecting employer-sponsored training. But existing market forces and management practices still appear to leave some imbalances in employer-sponsored training. More specifically, some industries (such as construction and personal services), small firms (such as firms with under 20 employees), and blue collar workers (such as marketing/sales and administrative/clerical workers) all had lower participation rates. Hence in these areas public policies can play an important role to encourage training and hence maintain the skills and competitiveness of the Canadian labour force.

To better understand employer-sponsored training, knowledge of training duration is also required. Given that there may be trade-offs between the incidence and the duration of training, the distribution of training hours across different groups of firms and workers may be quite

different from the distribution of training participation. For example, do some types of firms choose to concentrate training resources on a few employees rather than spreading them over a larger group of workers? Are the determinants of short-duration training different from those of long-duration training? How does firm size affect the duration of training? Issues such as these are important yet rarely addressed in the literature. Due to length limitation, they are out of scope for this paper. We address these questions in a companion paper (Xu and Lin 2005).

References

- Acemoglu, Daron (1997). "Training and Innovation in an Imperfect Labour Market," *Review of Economic Studies*, 64, 445-464.
- Acemoglu, Daron and Jörn-Steffen Pischke (1998). "Why Do Firms Train? Theory and Evidence," *Quarterly Journal of Economics*, 113, 79-119.
- Acemoglu, Daron and Jörn-Steffen Pischke (1999a). "Beyond Backer: Training in Imperfect Labour Markets," *Economic Journal*, 109, F112-F142.
- Acemoglu, Daron and Jörn-Steffen Pischke (1999b). "Minimum Wages and On-the-Job Training," NBER Working Paper No. 7184.
- Acemoglu, Daron and Jörn-Steffen Pischke (1999c). "The Structure of Wages and Investment in General Training," *Journal of Political Economy*, 107, pp. 539-572.
- Acemoglu, Daron and Jörn-Steffen Pischke (2000). "Certification of Training and Training Outcomes," *European Economics Review, Papers and Proceedings*, 44, 917-927.
- Altonji, Joseph and James Spletzer (1991). "Worker Characteristics, Job Characteristics, and Receipt of On-the-Job Training," *Industrial and Labor Relations Review*, 45 (1), 58-79.
- Anonymous (2001). "Human Resources Practices: Survey Results," *The Worklife Report*, 13(4), 6-8.
- Autor, David H. (2001). "Why Do Temporary Help Firms Provide Free General Skill Training," *Quarterly Journal of Economics*, 116, 1409-1448.
- Barrie, John and R. Wayne Pace (1998). "Learning of Organizational Effectiveness: Philosophy of Education and Human Resources Development," *Human Resource Development Quarterly*, 9, 40-44.
- Barron, John M., Dan A. Black, and Mark A. Loewenstein (1989). "Job Matching and On-the-Job Training," *Journal of Labor Economics*, 7, 1-19.
- Barron, John, Dan Black, and Mark Loewenstein (1987). "Employer Size: The Implications for Search, Training, Capital Investment, Starting Wages, and Wage Growth," *Journal of Labor Economics*, 5(1), 76-89.
- Barron, John, Dan Black, and Mark Loewenstein (1989). "Job Matching and On-the-job Training," *Journal of Labor Economics*, 7(1), 1-19.
- Becker, Gary (1964). *Human Capital*, New York: Columbia University Press for National Bureau of Economic Research.

- Becker, Gary (1975). *Human Capital*, 2nd ed. New York: National Bureau of Economic Research.
- Bishop, John (1991). "On-the-Job Training of New Hires," In David Stern and Jozef Ritzen (eds.), *Market Failure in Training? New Economics Analysis and Evidence on Training of Adult Employees*, Berlin: Springer-Verlag, 61-98.
- Blaxter, L. and M. Tight (1995). "Life Transition and Educational Participation by Adults," *International Journal of Lifelong Education*, 14(3), 231-246.
- Blinder, Alan S. and Yoram Weiss (1976). "Human Capital and Labor Supply: A Synthesis," *Journal of Political Economy*, 84(3), 449-472.
- Bresnahan, Timothy F., Erik Brynjolfsson, and Lorin M. Hitt (2002). "Information Technology, Workplace Organization, and the Demand for Skilled Labor: Firm-Level Evidence," *Quarterly Journal of Economics*, 117, 339-376.
- Cameron, Colin and Pravin Trivedi (1998). *Regression Analysis of Count Data*, Cambridge: Cambridge University Press for Econometric Society Monograph Series.
- Courtney, Sean (1992). *Why Adults Learn- Toward a Theory of Participation in Adult Education*, New York: Routledge.
- De Broucker, Patrice, 1997. "Job-Related Education and Training - Who Has Access?" *Education Quarterly Review*, Product No. 81-003-XPB in the Statistics Canada catalogue, Vol. 4, No.1, p. 10 to 31.
- Díaz-Vázquez, Pilar and Dennis Snower (2003). "On-the-Job Training, Firing Costs and Employment", Mimeo, Universidad de Santiago de Compostela, Departamento de Fundamentos del Análisis Económico, Spain.
- Dustmann, Christian and Uta Schönberg (2004). "Training and Union Wages," IZA Discussion Paper No. 1435, December 2004.
- Friedlander, Daniel, David H. Greenberg and Phillip K. Robins (1997). "Evaluating Government Training Programs for the Economically Disadvantaged," *Journal of Economic Literature*, 35, 1809-1855.
- Government of Canada (2002a). *Achieving Excellence: Investing People, Knowledge and Opportunity*, Ottawa: Industry Canada.
- Government of Canada (2002b). *Knowledge Matter: Skills and Learning for Canadians*, Ottawa: Human Resources Development Canada.
- Greene, William H. (2003). *Econometric Analysis*, 5th ed, Upper Saddle River, New Jersey: Prentice Hall.

- Greenhalgh, Christine and Stewart, Mark (1987). "The Effects and Determinants of Training," *Oxford Bulletin of Economics and Statistics*, 49(2), 171-190.
- Heckman, James and Jeffrey Smith (1999). "The Pre-Program Earnings Dip and the Determinants of Participation in a Social Program: Implications for Simple Program Evaluation Strategies," *Economic Journal*, 109(457), 313-348.
- Heckman, James J. (1979). "Sample Selection Bias as a Specification Error," *Econometrica*, 41(1), 153-162.
- Helpman, Elhanan (2004). *The Mystery of Economic Growth*, Cambridge, Massachusetts: Harvard University Press.
- Holtmann, Alphonse and Todd Idson (1991). "Employer Size and On-the-Job Training Decisions," *Southern Economic Journal*, 58(2), 339-355.
- Hosmer, D.W., and Lemeshow, S. (2000). *Applied Logistic Regression*, 2nd ed. New York: Wiley.
- Houle, Cyril Orvin (1961). *The Inquiring Mind: A Study of the Adult Who Continues to Learn*, Madison, WI: University of Wisconsin Press.
- Hui, Shek-wai and Jeffrey Smith (2003a). "The Labour Market Impacts of Adult Education and Training in Canada," Product No. 81-595-MIE-No. 008 in the Statistics Canada and Human Resources and Development Canada Catalogue.
- Hui, Shek-wai and Jeffrey Smith (2003b). "Issues in the Design of Canada's Adult Education and Training Survey," Product No. 81-595-MIE-No. 009 in the Statistics Canada and Human Resources and Development Canada Catalogue.
- Hui, Shek-wai and Jeffrey Smith (2004). "The Determinants of Participation in Adult Education and Training in Canada," *Journal of Labor Economics*, 22(4), 243-298.
- Hum, Derek and Wayne Simpson (2003). "Job-Related Training Activity by Immigrants to Canada," *Canadian Public Policy*, 29(4), 469-490.
- Illeris, K. (2000). *The Three Dimensions of Learning – Contemporary Learning Theory of the Tension Fields between Piaget, Freud and Marx*, Denmark: Roskilde University Press.
- Javanovic, Boyan (1979). "Job Matching and the Theory of Turnover," *Journal of Political Economy*, 87, 972-990.
- Jennings, Philip. (1996). "Employer-Sponsored Training in Canada: Evidence from the 1994 Adult Education and Training Survey," Working Paper Series, W-96-4E, Applied Research Branch, Strategic Policy, Human Resources Development Canada.

- Kapsalis, Constantine (1996). "The Roles of Employees in Training Decisions in Canada," *Canadian Business Economics*, Fall 1996, 71-80.
- Kiefer, N. (1988). "Economic Duration Data and Hazard Function," *Journal of Economic Literature*, 26, 646-79.
- Léonard, André, (2001). "Socio-economic Changes in the Population and Participation in Job-related Training," *Education Quarterly Review*, Vol. 7, No. 4, September, 7-17, Product No. 81-003-XPB in the Statistics Canada Catalogue.
- Lillard, Lee and Hong Tan (1992). "Private Sector Training: Who Gets It and What Are Its Effects?" In Ronald Enrenberg (ed.), *Research in Labor Economics*, Volume 13, Greenwich, CT: JAI Press, 1-62.
- Lin, Zhengxi and Jean-Francois Tremblay (2003). "Employer-Supported Training in Canada: Policy-Research Key Knowledge Gaps and Issues," Ottawa: HRSDC-IC-SSHRC Skills Research Initiative Working Paper 2003 B-01.
- Lindeman, Eduard (1961). *The Meaning of Adult Education*, Harvest House, Montreal.
- Loewenstein, Mark A. and James R. Spletzer (1998). "Dividing the Costs and Return to General Training," *Journal of Labor Economics* 16, 142-171.
- Long, J.S. (1997). *Regression Models for Categorical and Limited Dependent Variables*, Thousand Oaks, CA: Sage.
- Lynch, Lisa (1992). "Private-Sector Training and the Earnings of Young Workers," *American Economic Review*, 82(1), 299-312.
- Maddala, G. S. (1983). *Limited-dependent and Qualitative Variables in Econometrics*, New York: Cambridge University Press, 160-162.
- Markusen, James R. and Thomas F. Rutherford (2004). "Learning on Quick and Cheap: Gains from Trade through Imported Expertise," NBER Working Paper No. 10693.
- Mincer, Jacob (1962). "On-the-Job Training: Costs, Returns and Some Implications," *Journal of Political Economy*, 70(5), 50-79.
- Mincer, Jacob (1974). *Schooling, Experience and Earnings*, New York: Columbia University Press.
- Mincer, Jacob (1983). "Union Effects: Wages, Turnover and Job Training," In J. Reid, Jr. (ed.), *Research in Labor Economics: New Approaches to Labor Unions*, Supplement 2. Greenwich, CT: JAI Press. 217-252.

- Mincer, Jacob (1988). "Job Training, Wage Growth, and Labor Turnover," NBER Working Paper No. 2690.
- Mincer, Jacob (1989). "Human Capital Response to Technological Change in Labor Market," NBER Working Paper No. 3207.
- Mincer, Jacob (1994) "Investment in U.S. Education and Training," NBER Working Paper No. 4844.
- OECD (2003). *Beyond Rhetoric: Adult Learning Policies and Practices*, Paris, France: OECD Publications Service.
- Polacheck and Siebert (1993). *The Economics of Earnings*, Cambridge and New York: Cambridge University Press.
- Reid, Renee S. and John S. Adams (2001). "Human Resource Management – A Survey of Practices within Family and Non-Family Firms," *Journal of European Industrial Training*, 25, 310-320.
- Rosen, Sherwin H. (1987). "Human Capital," in *The New Palgrave: A Dictionary of Economics*, New York: Macmillan Press.
- Schultz, Theodore William (1970). *Investment in Human Capital; The Role of Education and of Research*, New York: Free Press.
- Simpson, Wayne (1984). "An Econometric Analysis of Industrial Training in Canada," *Journal of Human Resources*, 19(4), 435-451.
- Statistics Canada and Human Resources Development Canada (1995). *Adult Education and Training Survey - 1992*, Product No.81F0007XPE in the Statistics Canada Catalogue.
- Statistics Canada and Human Resources Development Canada (1997). *Adult Education and Training in Canada: Report of the 1994 Adult Education and Training Survey*, Product No. 81-583-XPE in the Statistics Canada Catalogue.
- Statistics Canada and Human Resources Development Canada (2001). *A Report on Adult Education and Training in Canada: Learning a Living*, Product No. 81-586-XPE in the Statistics Canada Catalogue.
- Statistics Canada and Human Resources Development Canada (2004). *Working and Training: First Results of the 2003 Adult Education and Training Survey*, Product No. 81-595-MIE – No. 15 in the Statistics Canada Catalogue.
- Statistics Canada (2004). *Guide to the Analysis of the Workplace and Employee Survey 2002*, Ottawa, Canada; Catalogue No. 71-221-GIE; also available on Internet free.

- Stevens, Margaret (1994). "A Theoretical Model of On-the-Job Training with Imperfect Competition," *Oxford Economic Papers*, 46, 537-562.
- Stewart, Mark B. (1983). "On Least Square Estimation When the Dependent Variable Is Grouped," *Review of Economic Studies*, 50(4), 737-753.
- Tobin, James (1958). "Estimation of Relationships for Limited Dependent Variables," *Econometrica*, 26(1), 24-36.
- Turcotte, J., A Leonard and C. Montmarquette (2003). "New Evidence on the Determinants of Training in Canadian Business Locations," Ottawa: Statistics Canada and HRDC, *The Evolving Workplace Series*, Catalogue No. 71-584-MIE.
- Tuijnman, A. C., (1996). "Providers of Adult Education: An Overview," *International Encyclopedia of Adult Education and Training*, 2nd ed. New York: Pergamon Press.
- Way, Sean A. and James W. Thacker (2001). "The Successful Implementation of Strategic Human Resource Management Practices: A Canadian Survey," *International Journal of Management*, 18(1), 25-32.
- Weiss, Yoram (1986). "The Determination of Life Cycle Earnings: A Survey," in Ashenfelter and R. Layard (eds.) *Handbook of Labor Economics*, Vol. 1, pp. 603-640, New York: North-Holland.
- Wooldridge, Jeffrey (2002). *Econometric Analysis of Cross Section and Panel Data*, Cambridge, Massachusetts: MIT Press.
- Xiao, Jin and Mun C. Tsang (2001). "Determinants of on-the-job Training and Adult Education in Shenzhen, China," Presented at International Conference on Economics of Education Beijing University, Beijing, China, May 16-19, 2001.
- Xu, Kuan and Zhengxi Lin (2005). "Employer-Sponsored Training Duration: Firm Characteristics and Worker Attributes," Ottawa: HRSDC-IC-SSHRC Skills Research Initiative, forthcoming.

Table 1 Participation Rates of Employer-sponsored Training: AETS Data

	1991	1993	1997	2002
	Rate of Participation	Rate of Participation	Rate of Participation	Rate of Participation
TOTAL	27.92%	26.83%	25.77%	36.69%
REGION AND PROVINCE				
NEWFOUNDLAND	26.79%	23.57%	20.94%	35.51%
PRINCE EDWARD ISLAND	21.15%	30.89%	25.85%	35.61%
NOVA SCOTIA	24.72%	28.11%	31.34%	38.02%
NEW BRUNSWICK	22.86%	24.87%	25.11%	36.95%
QUEBEC	24.00%	21.14%	18.02%	33.22%
ONTARIO	27.95%	27.19%	29.50%	36.90%
MANITOBA	31.63%	30.88%	27.34%	38.12%
SASKATCHEWAN	28.26%	29.78%	30.71%	37.31%
ALBERTA	35.55%	30.99%	28.83%	36.94%
BRITISH COLUMBIA	30.31%	31.12%	29.10%	40.61%
METRO AREAS				
MONTREAL	NA	NA	19.11%	33.59%
TORONTO	NA	NA	26.37%	35.08%
VANCOUVER	NA	NA	29.12%	40.77%
OTHER CMA OR NON-CMA	NA	NA	26.87%	36.78%
AGE GROUP				
25-34 YEARS	31.45%	27.01%	27.34%	42.52%
35-44 YEARS	31.89%	29.57%	28.69%	37.18%
45-54 YEARS	22.97%	27.08%	26.88%	36.21%
55-64 YEARS	14.00%	15.90%	15.46%	26.20%
GENDER				
MALE	28.11%	26.76%	25.61%	34.13%
FEMALE	27.69%	26.91%	27.57%	39.16%
MARITAL STATUS				
MARRIED/COMMON-LAW	28.47%	27.19%	26.59%	36.51%
SINGLE	26.83%	24.56%	23.82%	37.62%
OTHER	24.75%	27.30%	22.40%	36.18%
PRESCHOOL CHILDREN				
WITHOUT	27.01%	26.41%	25.19%	36.38%
WITH	31.48%	28.41%	28.19%	38.50%
EDUCATION				
0-8 YEARS, SOME SECONDARY	4.55%	6.37%	9.03%	13.64%
GRADE 11-13 GRADUATE	19.43%	17.83%	19.20%	24.82%
SOME PS, PS CERTIFICATE/DIPLOMA	32.84%	31.24%	28.33%	39.13%
UNIVERSITY	45.03%	38.93%	37.65%	56.22%
TYPE OF JOB				
FULL-TIME	29.61%	28.57%	27.30%	37.72%
PART-TIME	16.64%	14.62%	17.10%	31.42%
CLASS OF WORKER				
PAID WORKER, PRIVATE	25.32%	24.74%	40.09%	32.26%
PAID WORKER, PUBLIC	45.81%	42.50%	24.81%	52.82%
EMPLOYER	11.05%	12.08%	14.97%	27.20%
INDUSTRY				
AGRICULTURE	13.26%	10.73%	11.10%	21.09%
OTHER PRIMARY	26.24%	32.50%	29.66%	36.56%

MANUFACTURING, NON-DURABLES	25.56%	22.17%	20.23%	26.26%
MANUFACTURING, DURABLES	23.71%	25.84%	21.53%	25.05%
CONSTRUCTION	13.49%	11.56%	15.36%	21.36%
TRANSPORTATION, ETC	33.31%	29.05%	32.40%	30.79%
WHOLESALE TRADE	19.79%	22.90%	23.33%	32.09%
RETAIL TRADE	17.45%	15.15%	15.15%	24.97%
FINANCE, ETC	37.67%	36.59%	38.37%	50.55%
COMMUNITY SERVICES	36.59%	33.74%	33.28%	52.24%
PERSONAL SERVICES	8.92%	10.82%	8.75%	32.64%
BUSINESS AND MISC SERVICES	26.34%	24.35%	23.02%	29.09%
PUBLIC ADMINISTRATION	48.68%	50.09%	44.86%	56.19%
OCCUPATION				
WHITE COLLAR WORKER	31.52%	29.99%	29.20%	41.11%
BLUE COLLAR WORKER	18.79%	18.32%	16.91%	23.39%
JOB TENURE				
1-12 MONTHS	20.24%	13.35%	15.44%	36.31%
1-5 YEARS	28.28%	24.78%	25.36%	37.40%
6-10 YEARS	29.12%	31.53%	27.75%	35.69%
11-20 YEARS	32.53%	32.50%	29.05%	37.51%
OVER 20 YEARS	25.69%	28.95%	29.23%	35.77%
FIRM SIZE				
LESS THAN 20 EMPLOYEES	14.29%	14.29%	15.17%	26.66%
20 TO 99 EMPLOYEES	23.77%	23.07%	21.99%	33.65%
100 TO 499 EMPLOYEES	34.37%	30.72%	33.57%	39.74%
500 EMPLOYEES OR OVER	41.87%	41.34%	34.00%	43.87%
UNION MEMBERSHIP				
YES	36.14%	33.35%	30.41%	43.41%
NO	25.62%	24.87%	23.76%	35.61%
INCOME				
UNDER 15,000	13.11%	10.35%	8.10%	28.26%
15,000-19,999	19.25%	12.30%	12.86%	25.57%
20,000-29,999	27.17%	23.84%	21.40%	25.26%
30,000-39,999	36.56%	33.18%	29.66%	30.62%
40,000-49,999	44.75%	40.40%	38.16%	35.65%
50,000 OR MORE	48.77%	47.59%	42.39%	45.46%

Note: The participation rates are for employer-funded training programs and courses taken by employees.

Table 2 Participation Rates of Employer-sponsored Training: WES Data

	1999	2001
	Rate of Participation	Rate of Participation
VARIABLE GROUPS	All Training	All Training
TOTAL	54.78%	53.76%
REGION AND PROVINCE		
ATLANTIC	51.21%	54.25%
QUEBEC	46.60%	47.62%
ONTARIO	59.75%	58.34%
ALBERTA	59.28%	53.34%
BRITISH COLUMBIA	50.90%	47.64%
MANITOBA	56.15%	54.65%
SASKATCHEWAN	60.65%	53.22%
AGE GROUP		
AGE LESS THAN 25	53.44%	55.02%
AGED 25-34	58.45%	59.59%
AGED 35-44	57.35%	53.09%
AGED 45-54	53.48%	51.87%
AGED 55-64	43.55%	40.67%
AGE GREATER THAN 64	25.01%	20.83%
GENDER		
MALE	56.36%	53.49%
FEMALE	53.06%	54.02%
MARITAL STATUS		
MARRIED/COMMON-LAW	54.60%	53.26%
OTHER	55.18%	54.79%
PRESCHOOL CHILDREN		
WITHOUT	54.72%	53.74%
WITH	55.08%	53.86%
EDUCATION		
BELOW HIGH SCHOOL	39.34%	34.47%
HIGH SCHOOL GRADUATES	47.04%	45.54%
SOME UNIVERSITY OR POST SECONDARY	56.16%	56.35%
UNIVERSITY OR ABOVE	63.48%	64.95%
TYPE OF JOB		
FULL-TIME	56.06%	54.39%
PART-TIME	42.71%	46.88%
INDUSTRY		
FORESTRY, MINING, OIL, AND GAS EXTRACTION	61.94%	59.91%
LABOUR INTENSIVE TERTIARY MANUFACTURING	38.45%	35.00%
PRIMARY PRODUCT MANUFACTURING	52.64%	47.67%
SECONDARY PRODUCT MANUFACTURING	59.30%	52.19%
CAPITAL INTENSIVE TERTIARY MANUFACTURING	61.41%	55.04%
CONSTRUCTION	43.08%	43.28%

TRANSPORTATION, WAREHOUSING, WHOLESALE COMMUNICATION AND OTHER UTILITIES	55.43%	50.27%
RETAIL TRADE AND CONSUMER SERVICES	45.33%	44.99%
FINANCE AND INSURANCE	75.39%	75.97%
REAL ESTATE, RENTAL AND LEASING OPERATIONS	43.46%	40.14%
BUSINESS SERVICES	58.61%	61.49%
EDUCATION AND HEALTH SERVICES	61.39%	62.76%
INFORMATION AND CULTURAL INDUSTRIES	56.05%	55.36%
OCCUPATION		
MANAGERS	60.60%	58.13%
PROFESSIONALS	68.06%	68.19%
TECHNICAL/TRADES	51.45%	51.24%
MARKETING/SALES	43.08%	44.71%
CLERICAL/ADMINISTRATIVE	54.83%	51.92%
PRODUCTION WORKERS	44.63%	41.54%
JOB TENURE		
1-12 MONTHS	54.49%	53.59%
1-5 YEARS	58.87%	57.50%
6-10 YEARS	63.08%	51.24%
11-20 YEARS	60.83%	50.15%
FIRM SIZE		
LESS THAN 20 EMPLOYEES	43.62%	43.43%
20 TO 99 EMPLOYEES	54.46%	52.32%
100 TO 499 EMPLOYEES	61.47%	58.20%
500 EMPLOYEES OR OVER	65.76%	66.62%
UNION MEMBERSHIP		
YES	58.29%	58.18%
NO	53.42%	52.03%
INCOME		
UNDER 15,000	48.68%	47.67%
15,000-19,999	58.34%	52.88%
20,000-29,999	58.12%	44.67%
30,000-39,999	60.08%	60.93%
40,000-49,999	64.86%	66.25%
50,000 OR MORE	67.64%	66.91%
COMPLEXITY OF TECHNOLOGY		
REMAINED ABOUT THE SAME	46.31%	46.07%
INCREASED	62.53%	62.88%
DECREASED	50.29%	39.85%
AMOUNT OF TRAINING		
ABOUT RIGHT	54.93%	57.72%
TOO LITTLE	54.28%	56.97%
TOO MUCH	57.16%	41.33%
AVAILABILITY OF TRAINING		

INCREASED	71.24%	70.62%
REMAINED ABOUT THE SAME	45.83%	45.02%
DECREASED	52.05%	50.98%
OVERALL SKILL REQUIREMENTS		
INCREASED	63.99%	64.17%
REMAINED ABOUT THE SAME	44.63%	43.71%
DECREASED	36.81%	34.48%
TRAINING DECISION MARKERS		
BY NON MANAGERS	43.67%	45.14%
BY WORK GROUP	56.67%	61.03%
BY WORK SUPERVISOR	58.49%	55.57%
BY MANAGER/OWNER	54.90%	52.86%
TYPES OF INNOVATION		
NEW PROCESSES	62.59%	60.34%
NEW PRODUCTS OR SERVICES	58.15%	58.05%
ORGANIZATION CHANGE		
NO GREATER INTEGRATION	50.82%	51.01%
GREATER INTEGRATION	63.67%	63.19%
NO REDUCTION IN MANAGERIAL LEVELS	53.61%	53.06%
REDUCTION IN MANAGERIAL LEVELS	62.75%	64.63%
NO GREATER RELIANCE ON JOB ROTATION	53.85%	52.91%
GREATER RELIANCE ON JOB ROTATION	57.28%	57.42%
NO TOTAL QUALITY MANAGEMENT	53.01%	52.58%
TOTAL QUALITY MANAGEMENT	61.10%	60.49%
NO GREATER RELIANCE ON EXTERNAL SUPPLIERS	54.41%	53.41%
GREATER RELIANCE ON EXTERNAL SUPPLIERS	56.41%	56.62%
NO GREATER INTER-FIRM COLLABORATION IN R&D	52.73%	52.26%
GREATER INTER-FIRM COLLABORATION IN R&D	62.98%	64.45%
NO INCREASE IN DEGREE OF CENTRALIZATION	53.11%	51.73%
INCREASE IN DEGREE OF CENTRALIZATION	62.36%	65.61%
NO DOWNSIZING	54.22%	52.49%
DOWNSIZING	57.06%	61.27%
NO DECREASE IN DEGREE OF CENTRALIZATION	53.61%	53.38%
DECREASE IN DEGREE OF CENTRALIZATION	63.34%	58.51%
NO GREATER RELIANCE ON TEMPORARY WORKERS	54.33%	53.17%

GREATER RELIANCE ON TEMPORARY WORKERS	58.81%	59.51%
NO GREATER RELIANCE ON PART-TIME WORKERS	54.78%	53.52%
GREATER RELIANCE ON PART-TIME WORKERS	54.78%	55.80%
NO RE-ENGINEERING	49.64%	49.45%
RE-ENGINEERING	61.71%	62.52%
NO INCREASE IN OVERTIME HOURS	53.78%	52.56%
INCREASE IN OVERTIME HOURS	59.24%	60.08%
NO FLEXIBLE WORKING HOURS	54.43%	52.78%
ADOPTION OF FLEXIBLE WORKING HOURS	56.35%	60.64%
NEW		
COMPUTER/TECHNOLOGY		
NO NEW SOFTWARE APPLICATION OR HARDWARE	55.49%	52.49%
NEW SOFTWARE APPLICATION OR HARDWARE	59.48%	63.94%
NO OTHER TECHNOLOGIES OR MACHINERY	54.71%	53.68%
OTHER TECHNOLOGIES OR MACHINERY	55.73%	55.16%
COMPETITION		
NOT WITH CANADIAN-OWNED FIRMS	53.70%	53.00%
WITH CANADIAN-OWNED FIRMS	55.96%	54.69%
NOT WITH LOCALLY-OWNED FIRMS	60.67%	60.17%
WITH LOCALLY-OWNED FIRMS	51.03%	49.07%
WITH ANY OTHER FIRMS	55.15%	54.21%
WITHOUT ANY OTHER FIRMS	49.45%	45.68%
NOT WITH INTERNATIONALLY-OWNED FIRMS	53.03%	51.17%
WITH INTERNATIONALLY-OWNED FIRMS	60.67%	62.79%
NOT WITH AMERICAN-OWNED FIRMS	53.13%	51.83%
WITH AMERICAN-OWNED FIRMS	57.69%	57.43%
IMPORTANCE OF COMPETITION		
COMPETITION FROM CANADIAN-OWNED FIRMS NOT IMPORTANT	53.47%	52.74%
COMPETITION FROM CANADIAN-OWNED FIRMS IMPORTANT	56.31%	55.13%
COMPETITION FROM LOCALLY-OWNED FIRMS NOT IMPORTANT	60.24%	58.96%
COMPETITION FROM LOCALLY-OWNED FIRMS IMPORTANT	50.79%	49.53%

COMPETITION FROM INTERNATIONALLY-OWNED FIRMS NOT IMPORTANT	52.77%	51.20%
COMPETITION FROM INTERNATIONALLY-OWNED FIRMS IMPORTANT	62.51%	63.23%
COMPETITION FROM AMERICAN-OWNED FIRMS NOT IMPORTANT	53.03%	51.64%
COMPETITION FROM AMERICAN-OWNED FIRMS IMPORTANT	58.12%	57.97%

Note: The participation rates are for employer-funded courses training and on-the-job training at work places.

Table 3 Reasons of Non-participation: AETS Data

AETS Data	Reasons for not participating in employer-sponsored training			
	1991	1993	1997	2002
	%	%	%	%
Reason-too busy (generally or at work)	57.80	52.49	41.83	26.71
Reason -couldn't find training wanted	11.50	25.22	25.24	7.37
Reason-could not afford cost or too expensive/no money	25.65	35.87	39.61	52.20
Reason-family responsibilities	13.62	12.37	12.66	23.72
Reason-health	2.73	2.98	4.02	4.35
Reason-training at an inconvenient time	NA	24.96	35.41	16.86
Reason-no prerequisites	NA	3.79	5.22	5.71
Reason-lack of employer support	NA	25.19	25.66	4.83
Reason-lack of child care	NA	4.95	7.10	NA
Reason-because of language	NA	1.22	0.86	NA
Reason-not sure worth it	NA	NA	NA	7.08
Reason-conflict with work schedule	NA	NA	NA	25.35
Reason-lack of confidence	NA	NA	NA	3.77
Reason-other	14.10	12.57	11.29	11.91

Source: Authors' computations based on the AETS with rescaled final sampling weights.

Table 4 Participation Models: AETS Data

AETS	1991		1993		1997		2002	
Logistic Regression Models	No. of obs	19234	No. of obs	13257	No. of obs	11693	No. of obs	13069
	LR chi2(41)	1653.73	LR chi2(44)	907.95	LR chi2(45)	972.00	LR chi2(29)	649.47
	Prob > chi2	0.00	Prob > chi2	0.00	Prob > chi2	0.00	Prob > chi2	0.00
	Pseudo R2	0.24	Pseudo R2	0.15	Pseudo R2	0.15	Pseudo R2	0.07
	Log likelihood	-7947.03	Log likelihood	-6969.70	Log likelihood	-6000.33	Log likelihood	-8071.04
Independent Variable								
Participation	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value
NEWFOUNDLAND	0.70	0.02	0.71	0.05	0.78	0.16		
PRINCE EDWARD ISLAND	0.74	0.11	1.25	0.20	1.26	0.21		
NOVA SCOTIA	0.63	0.00	1.04	0.78	1.25	0.12		
NEW BRUNSWICK	0.59	0.00	0.83	0.19	0.79	0.09		
QUEBEC	0.62	0.00	0.50	0.00	0.47	0.00		
ONTARIO	0.76	0.01	0.75	0.01	0.88	0.26		
MANITOBA	1.14	0.30	1.10	0.50	1.01	0.92		
SASKATCHEWAN	1.12	0.35	1.17	0.25	1.15	0.33		
ALBERTA	1.33	0.01	1.03	0.84	0.88	0.34		
BRITISH COLUMBIA	Baseline		Baseline		Baseline		Baseline	
MONTREAL	NA		NA		0.83	0.21	0.82	0.06
TORONTO	NA		NA		0.77	0.02	0.75	0.00
VANCOUVER	NA		NA		0.69	0.01	1.18	0.15
OTHER CMA OR NON-CMA	Baseline		Baseline		Baseline		Baseline	
25-34 YEARS	7.28	0.00	1.98	0.00	2.06	0.00		
35-44 YEARS	6.00	0.00	1.80	0.00	1.78	0.00		
45-54 YEARS	3.91	0.00	1.70	0.00	1.63	0.00		
55-64 YEARS	Baseline		Baseline		Baseline		Baseline	
MALE	0.77	0.00	0.80	0.01	0.71	0.00		
MARRIED/COMMON-LAW	1.48	0.00	1.11	0.21			0.78	0.00
0-10 YEARS, SOME SECONDARY	0.30	0.00	0.37	0.00	0.38	0.00		
GRADE 11-13 GRADUATE	0.64	0.00	0.64	0.00	0.62	0.00		
SOME PS, PS CERTIFICATE/DIPLOMA	0.89	0.17	1.04	0.67	0.95	0.53		
UNIVERSITY	Baseline		Baseline		Baseline		Baseline	
FULL-TIME	1.21	0.08	1.32	0.02			1.34	0.00
PAID WORKER, PRIVATE EMPLOYER	0.81	0.04						
	0.75	0.12						
PAID WORKER, PUBLIC	Baseline		Baseline		Baseline		Baseline	
AGRICULTURE	0.95	0.81	0.42	0.00	0.53	0.07	0.58	0.10
OTHER PRIMARY	0.52	0.00	0.50	0.00	0.56	0.00	0.64	0.01
MANUFACTURING, NON-DURABLES	0.68	0.03	0.44	0.00	0.45	0.00	0.36	0.00
MANUFACTURING, DURABLES	0.64	0.01	0.46	0.00	0.44	0.00	0.30	0.00
CONSTRUCTION	0.39	0.00	0.30	0.00	0.52	0.01	0.32	0.00
TRANSPORTATION, ETC	0.76	0.08	0.53	0.00	0.77	0.06	0.40	0.00
WHOLESALE TRADE	0.53	0.00	0.40	0.00	0.51	0.00	0.38	0.00
RETAIL TRADE	0.60	0.00	0.31	0.00	0.33	0.00	0.50	0.00
FINANCE, ETC	1.04	0.81	0.57	0.00	0.76	0.07	0.86	0.28

COMMUNITY SERVICES	0.88	0.26	0.61	0.00	0.65	0.00	1.05	0.66
PERSONAL SERVICES	0.40	0.00	0.32	0.00	0.25	0.00	0.48	0.00
BUSINESS AND MISC SERVICES	0.64	0.01	0.53	0.00	0.42	0.00	0.50	0.00
PUBLIC ADMINISTRATION	Baseline		Baseline		Baseline		Baseline	
WHITE COLLAR WORKER	1.51	0.00	1.19	0.10	1.44	0.00		
TENURE: 1-12 MONTHS			0.60	0.00	0.66	0.00	1.54	0.00
TENURE: 1-5 YEARS			0.94	0.60	1.12	0.33	1.45	0.00
TENURE: 6-10 YEARS			1.17	0.23	0.98	0.85	1.31	0.00
TENURE: 11-20 YEARS			1.09	0.48	0.99	0.93	1.11	0.22
TENURE: OVER 20 YEARS	Baseline		Baseline		Baseline		Baseline	
LESS THAN 20 EMPLOYEES	0.48	0.00	0.39	0.00	0.54	0.00	0.56	0.00
20 TO 99 EMPLOYEES	0.58	0.00	0.57	0.00	0.74	0.00	0.75	0.00
100 TO 499 EMPLOYEES	0.85	0.07	0.74	0.00	1.17	0.03	0.88	0.09
500 EMPLOYEES OR OVER	Baseline		Baseline		Baseline		Baseline	
UNION MEMBER			0.64	0.00	0.69	0.00		
UNDER 15,000	0.15	0.00	0.24	0.00	0.14	0.00	0.60	0.00
15,000-19,999	0.24	0.00	0.25	0.00	0.21	0.00	0.40	0.00
20,000-29,999	0.39	0.00	0.44	0.00	0.39	0.00	0.36	0.00
30,000-39,999	0.61	0.00	0.66	0.00	0.55	0.00	0.49	0.00
40,000-49,999	0.83	0.09	0.82	0.07	0.82	0.04	0.63	0.00
50,000 OR MORE	Baseline		Baseline		Baseline		Baseline	

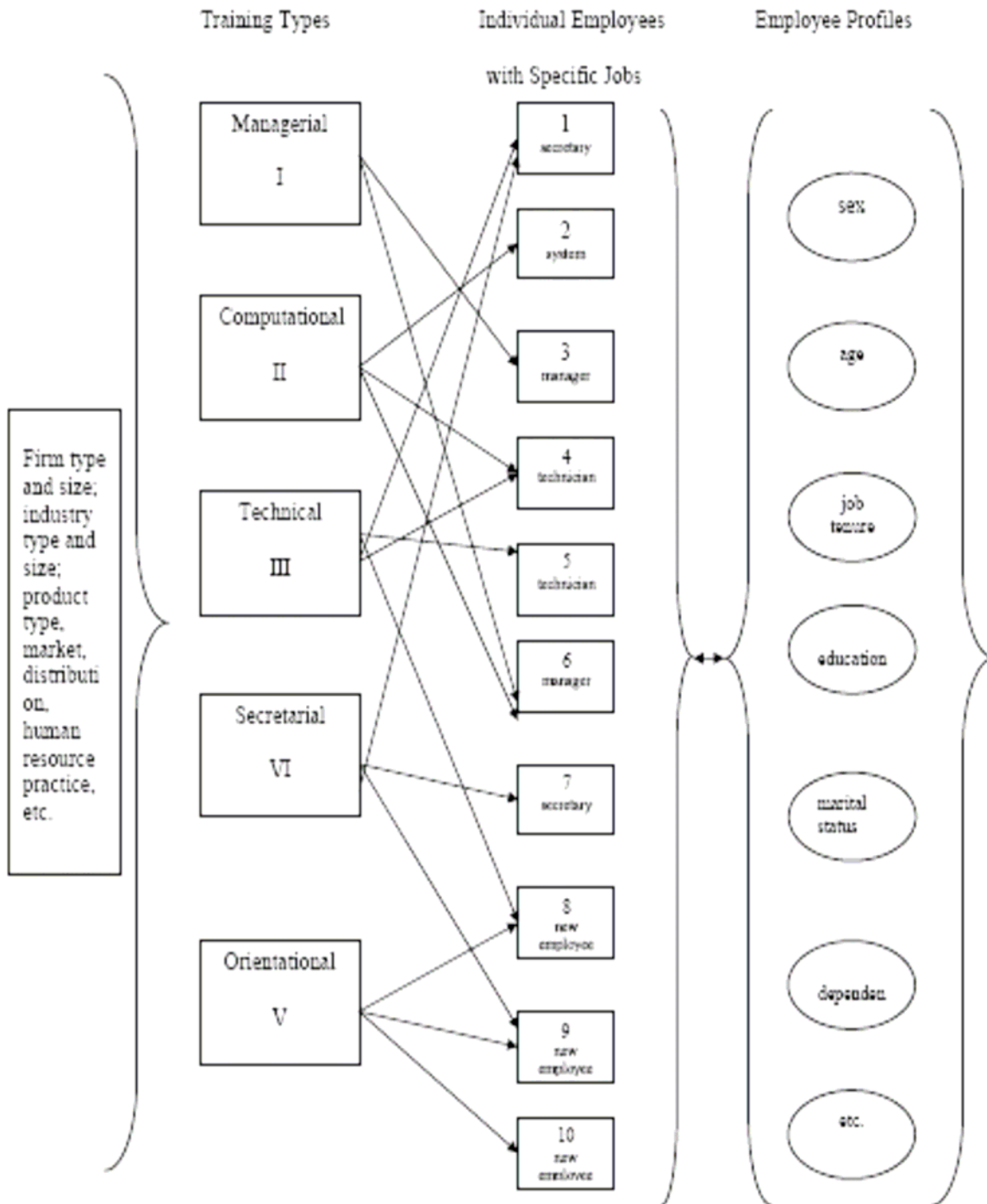
Table 9 Participation Models: WES Data

WES	1999		2001	
Logistic Regression Models	No. of obs	20662	No. of obs	19398
	LR chi2(42)	703.32	LR chi2(40)	664.35
	Prob > chi2	0.00	Prob > chi2	0.00
	Pseudo R2	0.11	Pseudo R2	0.12
	Log likelihood	-12577.54	Log likelihood	-11693.12
Independent Variable				
Participation				
	Odds Ratio	p-value	Odds Ratio	p-value
ATLANTIC CANADA			1.42	0.00
QUEBEC	0.82	0.02		
ONTARIO	1.23	0.01	1.40	0.00
ALBERTA	1.54	0.00	1.20	0.10
MANITOBA			1.30	0.05
SASKATCHEWAN	1.35	0.07	1.28	0.10
BRITISH COLUMBIA	Baseline		Baseline	
AGE	0.97	0.00	0.97	0.00
AGE SQUARED				
MALE	0.80	0.00		
MARRIED/COMMON-LAW				
PRESENCE OF YOUNG CHILDREN	0.79	0.01	0.80	0.08
GRADE 0-10	3.22	0.16		
GRADE 11-13	1.28	0.01	1.38	0.00
SOME PS, PS CERTIFICATE/DIPLOMA	1.21	0.00	1.17	0.05
UNIVERSITY	Baseline		Baseline	
FULL-TIME	1.58	0.00		
LABOUR INTENSIVE TERTIARY MANUFACTURING	0.48	0.00	0.36	0.00
PRIMARY PRODUCT MANUFACTURING	0.72	0.00	0.55	0.00
SECONDARY PRODUCT MANUFACTURING			0.61	0.00
CAPITAL INTENSIVE TERTIARY MANUFACTURING			0.66	0.00
CONSTRUCTION	0.77	0.05	0.81	0.15
TRANSPORTATION, WAREHOUSING, WHOLESALE			0.78	0.04
COMMUNICATION AND OTHER UTILITIES			2.01	0.00
RETAIL TRADE AND CONSUMER SERVICES	0.81	0.05	0.77	0.06
FINANCE AND INSURANCE	1.88	0.00	1.58	0.01
REAL ESTATE, RENTAL AND LEASING OPERATIONS			0.63	0.01
BUSINESS SERVICES				
EDUCATION AND HEALTH SERVICES				
INFORMATION AND CULTURAL INDUSTRIES	0.76	0.04	0.68	0.01
NATURAL RESOURCES	Baseline		Baseline	

MANAGERS		1.19	0.13	1.35	0.03
PROFESSIONALS		1.40	0.00	1.57	0.00
TECHNICAL/TRADES				1.24	0.02
MARKETING/SALES					
CLERICAL/ADMINISTRATIVE					
PRODUCTION WORKER	Baseline			Baseline	
TENURE		1.00	0.08		
1-19 EMPLOYEES		0.63	0.00	0.69	0.00
20-99 EMPLOYEES		0.88	0.13	0.86	0.06
100-499 EMPLOYEES					
500 EMPLOYEES OR MORE	Baseline			Baseline	
UNION MEMBER		1.17	0.06		
WAGE		1.00	0.08		
WAGE SQUARED					
TECH COMPLEXITY HIGH		1.29	0.00	1.27	0.00
TECH COMPLEXITY EQUAL					
TECH COMPLEXITY LOW	Baseline			Baseline	
TRAINING TIME HIGH					
TRAINING TIME EQUAL		1.22	0.00	1.70	0.00
TRAINING TIME LOW	Baseline			Baseline	
AVAIL TRAINING HIGH		2.06	0.00	1.92	0.00
AVAIL TRAINING EQUAL					
AVAIL TRAINING LOW	Baseline			Baseline	
SKILL REQUIRED HIGH		2.31	0.01	2.30	0.00
SKILL REQUIRED EQUAL		1.64	0.14	1.35	0.20
SKILL REQUIRED LOW	Baseline			Baseline	
TRAINING DECISION BY COWORKERS					
TRAINING DECISION BY WORKGROUPS					
TRAINING DECISION BY SUPERVISORS		1.19	0.01		
TRAINING DECISION BY MANAGERS					
NEW SOFT/HARDWARE				1.27	0.01
NEW TECHNOLOGY					
GREATER INTEGRATION		1.13	0.12		
GREATER CENTRALIZATION					
DOWNSIZING		0.85	0.04	1.17	0.11
GREATER DECENTRALIZATION					
GREATER RELIANCE ON TEMP WORKERS					
GREATER RELIANCE ON PART-TIME WORKERS		0.82	0.03		
REENGINEERING					
MORE OVERTIME				0.80	0.05
MORE FLEXIBLE HOURS					
LESS MANAGEMENT LEVELS				1.28	0.06
MORE JOB ROTATION		0.77	0.00		
TOTAL QUALITY CONTROL		1.23	0.01		
GREATER RELIANCE ON EXTERNAL SUPPLIERS		0.86	0.09		
MORE R AND D		1.18	0.06	1.18	0.08

COMPETITION FROM CANADIAN FIMRS	0.69	0.09		
COMPETITION FROM LOCAL FIRMS			0.55	0.01
NO COMPETITION			0.81	0.14
COMPETITION FROM OTHER INTERNATIONAL FIRMS	0.56	0.02		
COMPETITION FROM AMERICAN FIRMS				
IMPORTANCE OF CANADIAN COMPETITION	1.53	0.06		
IMPORTANCE OF LOCAL COMPETITION	0.79	0.00	1.47	0.11
IMPORTANCE OF OTHER INTERNATIONAL COMPETITION	2.18	0.00	1.40	0.00
IMPORTANCE OF AMERICAN COMPETITION				

Figure 1 Conceptual Framework for the Job Training and Individual and Firm Characteristics



Appendix Table 1 AETS Datasets and Their Major Characteristics

ATTRIBUTE	AETS 1992	AETS 1994	AETS 1998	AETS 2003
A Supplement to Labour Force Survey	Yes; Jan. 1992	Yes; Jan. 1994	Yes; Jan. and Mar. 1998	Yes; Feb. and Mar. 2003
Labour Force Survey Target Population	Canadians, aged 15 and older, in or not in labour force	Canadians, aged 15 and older, in or not in labour force	Canadians, aged 15 and older, in or not in labour force	Canadians, aged 15 and older, in or not in labour force
Labour Force Survey (LFS) Sample Size (Dwellings)	About 63,000	About 58,000	About 60,000	About 59,000
LFS Selected Household (Dwellings)	51,573	47,759	39,217	44,967
AETS Respondent Sample Size (Persons) excluding non-respondents	45,328	41,465	33,410	25,065
AETS Target Population	Canadians, aged 17 and older	Canadians, aged 17 and older	Canadians, aged 17 and older	Canadians, aged 25 and older ¹
Labour Force Occupation Classification	The 1980 Standard Occupational Classification	The 1980 Standard Occupational Classification	The Standard Occupational Classification (SOC-91)	The Standard Occupational Classification (SOC-91)
Labour Force Industry Classification	The 1980 Standard Industrial Classification	The 1980 Standard Industrial Classification	The North American Industry Classification System (NAICS)	The North American Industry Classification System (NAICS)
Personal Level Training Information	Job-related and personal interest training	Job-related and personal interest training	Job-related and personal interest training	Job-related and personal interest training
Training activities Level Information	Job-related and personal interest training	Job-related and personal interest training	Job-related and personal interest training	Job-related activities
Number of Training activities	Up to 15	Up to 15	Up to 15	Job-related activities 1; Other job-related activities 1
Labour Market Status	Labour Force Survey Reference week is used	Labour Force Survey Reference week is used	Labour Force Survey Reference week is used	Reference year is used
Second Language Training and Basic Reading, Writing, and Math Skills	Participation only	Participation only	Participation only	Participation in second language training and basic reading, writing and math skills

(continued)

Appendix Table 1 AETS Datasets and Their Major Characteristics (Concluded)

ATTRIBUTE	AETS 1992	AETS 1994	AETS 1998	AETS 2003
Training Provider ³	Location and Provider	Location and Provider	Location and Provider	Provider only
Work Placement	No	No	No	New
Distance Training, E-learning	No	No	No	New
Training Months	No	No	No	New
Training Duration Calculation	Program durations calculated in terms of the number of days with more than 6 hours, no precise duration (total hours) available	Program durations calculated in terms of the number of days with more than 6 hours, no precise duration (total hours) available	Program durations calculated in terms of the number of days with more than 6 hours, no precise duration (total hours) available	Program durations calculated with optional reporting in months, weeks, days, precise duration (total hours) available
Training Participation During Work Hours	No; paid or unpaid time-off available	No; paid or unpaid time-off available	No; paid or unpaid time-off available	New variable to replace paid or unpaid time-off
Mandatory Training participation	Who suggested training; indirect	Who suggested training; indirect	Who suggested training; indirect	Who required; direct
Training Motivation	Categorical variable in terms of importance	Categorical variable in terms of importance	Categorical variable in terms of importance	Composite variables in terms of detailed reasons
Training Outcomes ⁴	Categorical variable in terms of outcomes	Categorical variable in terms of outcomes	Categorical variable in terms of outcomes	Composite variables in terms of detailed reasons
Barriers to Training Module	No	No	No	New Barrier Module (BR)
Barriers to Formal Training	Social-economic factors only	Social-economic factors only	Social-economic factors only	Social-economic factors and specific barriers
Barriers to Job or Career-Related Training (needed)	No	No	No	New
Barriers to Job or Personal Interest Training (wanted)	No	No	No	New

Notes:

1. The comparison is made based on the 1992, 1994, 1998, and 2003 AETS (in particular the 2003 AETS Appendix IV).
2. As previous AETS surveys did not precisely identify students still in their initial stage of schooling, analyses using this data had to rely on an ad hoc definition of adult learners. According to this definition, individuals aged 17 to 24 who were not in one of the following situations were excluded from the analysis: full-time students subsidized by an employer and full-time students over 19 enrolled in elementary or secondary programs. The new target population is also consistent with the Organisation for Economic Co-operation and Development (OECD) standard.
3. The training provider refers to the institution or person who is providing the training and not to the training organizer or financier. Training motivation and training outcomes can be used to measure expected and realized results.

Appendix Table 2 WES Datasets and Their Major Characteristics

Year	Workplaces			Employees		
	Sample Size	Estimated Population	Response Rate	Sample Size	Estimated Population	Response Rate
1999	6,322	718,083	95.2%	23,540	10,777,543	82.8%
2001	6,223	701,123	85.9%	20,377	11,605,442	86.9%

Appendix Table 3 List of Variables from AETS

Variables Description	The 1992, 1994, 1998 and 2003 AETS Variable
Sampling weights	WEIGHT
Labour force status	LFSTATUS
Training status	TRNGSTAT
Participation/provision of employer-sponsored training	PARTPROV
Duration spell of job-related training programs	MDURPM
Duration spell of job-related training courses	MDURCR
Province	PROVINCE
Metropolitan areas	METRO
Age	AGE
Gender	SEX
Marital status	MARITAL
Presence of young pre-school children	MRESCHL
Education attainment	EDUC
Job status	PTFT
Class of workers	WKCLASS
Industry	INDUSTRY
Occupation	OCCUP
Job tenure	TENURE
Firm size	FIRMSIZE
Union membership	UNION
Income levels	INCOME

Appendix Table 4 List of Variables from 1999/2001 WES

	VARIABLE DESCRIPTION	VARIABLE NAME
CLASSROOM JOB-RELATED TRAINING	Received classroom training	PARTCLRM
	Length of first course taken	DURCLRM
ON-THE-JOB TRAINING	Received on-the-job training	PARTOTJ
	Time spent on-the-job training	DUROTJ
REGION	Region	DOM_REG
	Atlantic	ATLANTIC
	Québec	QC
	Ontario	ON
	Alberta	AB
	British Columbia	BC
	Manitoba	MB
	Saskatchewan	SK
AGE	Employee birth date	AGE
	Age groups	AGE_GRP
	Age group: less than 25	AGELT25
	Age group: 25-34	AGE25_34
	Age group: 35-44	AGE35_44
	Age group: 45-54	AGE45_54
	Age group: 55-64	AGE55_64
	Age group: 65 and older	AGEGT64
GENDER	Gender	MALE
MARITAL STATUS	Marital status	MARRIED
DEPENDENT CHILDREN	Dependent children	PRESCH
SCHOOLING	Highest grade of ele. or hs completed	EDUC
	Schooling: Less than 10 years	GRADE10
	Schooling: 10-13 years	GRADE13
	Schooling: Some post-secondary	SOMEPS
	Schooling: University and above	UNIVER
EMPLOYMENT STATUS	Terms of employment	FULLTIME
INDUSTRY	WES Industry Aggregation	DOM_IND
	Forestry, mining, oil, and gas extraction	NATRESRC
	Labour intensive tertiary manufacturing	MANUL3RD
	Primary product manufacturing	MANU1ST
	Secondary product manufacturing	MANU2ND
	Capital intensive tertiary manufacturing	MANUK3RD
	Construction	CONSTRUT
	Transportation, warehousing, wholesale	TRANSWHS
	Communication and other utilities	COMMUTIL
	Retail trade and consumer services	RETAIL
	Finance and insurance	FININSUR
	Real estate, rental and leasing operations	REALEST
	Business services	BUSISRV
	Education and health services	EDHTHSRV
	Information and cultural industries	INFOSRV
OCCUPATION GROUPS	WES occupation group	OCP_GRP
	Managers	MGMT
	Professionals	PROF
	Technical/Trades	TECH

	Marketing/Sales	SALES
	Clerical/Administrative	ADMIN
	Production workers	PRODWKR
JOB TENURE	Number months previously worked for employer	TENURE
	Job tenure groups	TEN_GRP
FIRM SIZE	Size	FIRMSIZE
	1-19 employees	FZ20LS
	20-99 employees	FZ20TO99
	100-499 employees	FZ1HTO5H
	500 employees or more	FZ5HPLS
UNION	Covered by CBA	UNION
INCOME	Wage	WAGE
COMPLEX TECHNOLOGY	Complexity of technology	TECH_COM
CIAL CHANGE	Remained about the same	CMPLXQU
	Increased	CMPLXHI
	Decreased	CMPLXLO
SUBJECTIVE VIEW/ ON TRAINING-MOTIVATION	Amount of training	AMTRAIN
	about right for the demands of the job	AMTTREQU
	too little for the demands of the job	AMTTRLO
	too much for the demands of the job	AMTTRHI
	Not applicable, no training required	AMTTRNND
	Availability of training	AVTRAIN
	increased	AVTRHI
	remained about the same	AVTREQU
	decreased	AVTRLO
	Overall skill requirements	SKILL
	increased	SKILLHI
	remained about the same	SKILLEQU
	decreased	SKILLO
HUMAN RESOURCE PRACTICE	Training decided by Groups	DSCNBY
	Training decided by non managers	BYCOWKR
	Training decided by work group	BYWKGRP
	Training decided by work supervisor	BYSUPER
	Training decided by manager/owner	BYMGMT
	Training decided by people outside workplace	BYOUTSID
ORGANIZATION CHANGE	Greater integration among different functional areas	INTEGRATE
	Reduction in the number of managerial levels	LESSMGNT
	Greater reliance on job rotation, multi-skilling	ROTATION
	Implementation of total quality management	QUALITY
	Greater reliance on external suppliers of prod./serv.	EXTERNAL
	Greater inter-firm collaboration in R&D, production	RANDD
	Other, specify	OTHER
	Increase in degree of centralization	CENTRALI
	Downsizing	DOWNSID
	Decrease in degree of centralization	DCENTRA
	Greater reliance on temporary workers	TEMPWKR
	Greater reliance on part-time workers	PTWKR
	Re-engineering	REENGINE
	Increase in overtime hours	OVERTIME

TECHNOLOGY USE - COMPUTER	Adoption of flexible working hours	FLXBHOUR
TECHNOLOGY USE - OTHER TECHNOLOGY	Implementation of new software application or hardware	NEW_SOFT
INNOVATION	Implementation of other technologies or machinery	OTH_TECH
	Innovation Types	INOVTYPE
	Innovation: Improved processes	IMPV_PRC
	Innovation: improved products or services	IMPV_PRD
	Importance of innovation	INNOV
	Innovation: new processes	NEW_PRC
	Innovation: new products or services	NEW_PRD
