

Effects of New Information Technology, Innovation and Competition on On-the-Job Training in Canada¹

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Invited Paper submitted to the IIRA 14th World Congress, Track 3, Oral Presentation 277
Lima, Peru, September 11-14, 2006
Submission Date: December 13, 2005

¹ This study is supported by an INE Skills Research Initiative grant from the Social Sciences and Humanities Research Council of Canada under the joint initiative of Human Resources and Skills Development Canada, and Industry Canada. Access to data for this paper was received through Statistics Canada Research Data Centre at McMaster University. The article represents the views of the authors and does not reflect opinions of Statistics Canada or funding agencies. Research Assistance of C. Jiao in an earlier version of the study is greatly appreciated.

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Word Count: Abstract 219 words
Full Article: 7,475 words

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Abstract

Economic growth and prosperity as well as inclusion and equality can be achieved by providing opportunities for workers to learn and develop their skills and abilities. Much less is known about on-the-job training that takes place at the workplace level, and the types of workplaces that provide on-the-job training to their employees. Further examination of the workplace factors as determinants of on-the-job training is essential to develop sound and effective policies to provide training in an equitable manner. The purpose of this study is to examine the effects of implementing new information technology, innovation, and competition experienced by the workplace as determinants of on-the-job training. The study uses a Canada-wide survey of employers and employees (the 1999 Workplace and Employee Survey of Statistics Canada). Results show that implementing new information technology, the introduction of innovation, and the competition level of the workplace positively affect the incidence of on-the-job training. After controlling for a range of other variables, multivariate results show that the interaction of these variables affect the incidence of on-the-job training. When a workplace has not implemented new information technology, is not an innovator, and is not experiencing competition, it is significantly less likely to provide on-the-job training. The results are important because this underinvestment can have negative implications for those workplaces and, especially, their affected workers.

1. Introduction

In the global competitive, technology-intensive and knowledge-based economy, skilled human resources are one of the most important factors for success (*Achieving Excellence* 2002, *Knowledge Matters* 2002). Economic growth and prosperity as well as inclusion and equality can be achieved by providing opportunities to workers to learn and develop their skills and abilities. For all workers to realize their earning potential and to increase their employability, life-long learning, particularly job skills training and skills upgrading, are an integral part of maintaining their competitive employability profile (OECD 2003; Statistics Canada 1997). However, research suggests that employers in Canada are under-investing in the training they provide to their employees (Lin & Tremblay 2003).

We have a considerable amount of knowledge on employee training that is provided in more formal ways such as attending classes inside or outside the workplace. However, much less is known about the informal training that takes place at the workplace (i.e. plant, office, or store) level (Chaykowski & Slotsve 2003: 2) and the determinants of training decisions of employers (Lin & Tremblay 2003). Further examination of this type of training is essential to develop sound and effective policies aimed at encouraging on-the-job training in an equitable manner.

The purpose of this paper is to examine the effects implementing new information technology (adoption of new software and hardware in the workplace), innovation introduced in the workplace, and competition experienced by the workplace on on-the-job training. The unit of analysis is the individual worker level using the Workplace and Employee Survey (WES) 1999

data. The WES data links employee responses with workplace (i.e. employer) characteristics allowing us to incorporate in the analysis possible determinants of on-the-job training.

2. Theoretical background and factors affecting on-the-job training

In terms of the theory on employer-sponsored training, labour economics research largely uses Becker's (1962, 1964) investment in human capital theory. Investment in human capital occurs via formal training and on-the-job (OTJ) training. OTJ training can be formal (post schooling) training by the firm in a structured program. It typically takes place in a classroom or apprenticeship environment. On-the-job training can be informal training takes place in an unstructured program that can easily adapt to circumstances. It is usually in the form of mentoring, or shared learning-by-doing. This paper focuses on the informal OTJ training. Becker's theory asserts that employers invest in their employees' on-the-job training with expectation that upgrading their skills will contribute to the firm's productivity, quality of its products, and competitiveness (Becker 1962, 1964). Using Becker's definition, OTJ training is a process that raises future productivity and differs from school training in that the investment in human capital is made on-the-job rather than in a teaching institution.

The human resources management literature focuses on learning theories (Belcourt et al. 2000; Noe 2005), and there is no human resources management theory to guide our training analysis. The practice in the field shows that employers use training for three purposes: to increase the productivity or the performance of its workers, to achieve organizational goals, and to invest in

workers to succeed in continual transformation of their firms in the unpredictable and turbulent business environment (Belcourt et al. 2000).

In our paper we incorporate these different sets of theories and practice-based knowledge in examining the three workplace determinants of OTJ training. The incidence of on-the-job training is the dependent variable. It refers to whether or not workers' receive on-the-job training. The determinants that we focus on as independent variables are: whether or not the workplace implemented new information technology, introduced innovation in the workplace, and experienced competition. Many other workplace, industry, human capital, and individual characteristics are included in our analysis as control variables.

Employers clearly have a range of strategic options regarding the utilization of labour (e.g. Osterman 1984). At one end of the spectrum, work can be de-skilled and disposable (Verma & Chaykowski 1999) or can be arranged so that the internal workforce is highly skilled, motivated, and committed (Osterman 2000; Godard & Delaney 2000; Grenier, Giles & Belanger 1997). Hendry and Pettigrew (1992) suggest that HR practices should be consistent with the environmental conditions. An organization facing retrenchment, for instance, requires a different approach than a growing business. In an increasingly global and competitive business environment, organizations need to- and are- rethinking their human resource strategies and policies (e.g. Betcherman & Lowe 1997; Caudron 2001; Chaykowski & Gunderson 2001; Delaney & Godard 2001; Godard & Delaney 2000; Verma & Chaykowski 1999; Walker 1990). On the whole, most of these observers suggest that developing a highly trained workforce is a logical way to be able to respond quickly to an increasingly competitive, unstable business

environment. Thus, we expect that technology adoption, the introduction of innovation, and the level of competition will be positively associated with OTJ training.

3. Methodology

3.a. Data

This paper uses Statistics Canada's Workplace and Employee Survey (WES) 1999 employee micro data linked to workplace (i.e. employer) micro data. The advantage of the WES is that it links employer and employee responses. It provides more accurate and unbiased estimates of the effect of particular firm and worker characteristics, and gives an indication about how the attributes of the employees and firms' activities jointly affect training decisions (Lin and Tremblay 2003). WES surveys firms in all industries, with the exception of agriculture, fishing, fur trapping and public administration. WES covers all firms regardless of size. The 1999 WES has data on 24,597 employees from 6,351 workplaces, with a response rate of 83% and 94% respectively. (For more on sampling and sample design, see WES Compendium 2001). As we discuss below, this study uses individual workers as the unit of analysis.

3.b. Variables

The incidence of on-the-job training is the dependent variable. It asks workers whether in the past 12 months they received any on-the-job training. This variable comes from the Employee Survey of WES 1999. The independent variables are whether or not implemented new information technology, innovation introduced in the workplace, and competition experienced by the workplace come from the employer data. They come from the Workplace (i.e. Employer)

Survey of WES 1999. The control variables of the size of the workplace, workplace part-time and temporary worker rate and industry also come from the employer data. Worker-level control variables come from the employee data. Exact wording of these questions with coding information are provided in Table 1. Due to space limitations we are not providing the literature on control variables, but are available from the authors.

< Insert Table 1 here >

3.c. Analysis

In terms of data analysis, we first present descriptive statistics of all variables. This provides a sense of the workers included in this study. For ease of presentation, these outputs are provided in the form of percentages and/or bar charts. Next, bivariate correlations are provided between the dependent and independent variables. In each case, we record the coefficient and significance level of each correlation.

We then proceed to examine the determinants of on-the-job training via multivariate logistic regression analyses to isolate the relationships between independent and dependent variables. For each regression model, we present the odds ratios, regression coefficients, and bootstrapped standard errors for each independent variable, as well as the Wald chi-square as an indicator of model fit. It is important to note that these are not separate measures of the relationship between the dependent variable and the independent variables (Menard 2001). They contain the same information. One shows the probabilities and the other presents the direction of association. In our discussions of the effect of the independent variables, we use odds ratios since they are easier to interpret in logistic regression. As Kennedy (2003) discusses, in nonlinear functional forms of analysis such as logit, because of the nonlinearities, the marginal effect of an explanatory variable on dependent variable creates a dilemma of reporting. There are three measures of

reporting marginal effects that are popular in the literature, and all three methods “can give misleading estimates of probability changes in contexts in which an explanatory variable is postulated to change by an amount that is not infinitesimal, as is always the case with a dummy variable, for example” (Kennedy 2003: 266). Most of our variables are dummy variables, and thus we suggest that the odds ratios should be used to interpret results.

In the logistic regression analysis of OTJ training, we first run the regression with the full set of independent and control variables. Next we run the same analysis including interaction variables (i.e. interaction between variables that are the focus of our analysis). We are seeking to understand whether the interaction variable adds to our ability to explain the effect on the dependent variable. When the interaction involves a nominal variable with more than two categories, it is necessary to compare the model with and without all of the interaction terms to determine whether the interaction is statistically and substantively significant (Menard 2001).

All of the analysis has been generated using weighted micro data accessed at Statistics Canada’s McMaster University Research Data Centre. Statistics Canada strongly recommends the use of bootstrapping in statistical analysis using the WES dataset due to its complex survey design. Bootstrapping involves represents “resampling” the data with replacement to generate an empirical estimate of the entire sampling distribution of a statistic (Mooney & Duval 1993). Any data that involves complex sampling methodology requires special analytic consideration of bootstrapping (Mooney & Duval 1993). Bootstrapping refers to a process of repeatedly drawing random samples, with replacement, from the data at hand (Hamilton 2003). In all regression results presented here, we use Statistics Canada’s mean bootstrap weights using the revised Stata “bswreg” ado file by Chowhan and Buckley (2005). This is the revised file of the bootstrapped

employee weights of the Stata ado file developed by Pierard, Buckley, and Chowhan (2004). The Stata program developed by Pierard et al. (2004) calculates variance estimates using bootstrap weights. This is an easy to use and flexible tool within Stata, which can be employed with the bootstrap weights that are made available with most of Statistic Canada's micro-data sets. The use of bootstrap weights allows researchers to make use of complex survey design information and calculate reliable variance estimates.

3.d. Limitations of the study

On-the-job training takes place at the workplace level and therefore the WES data used here is the best available data for this analysis. However, policy issues such as access to training might be developed and implemented at the firm/organizational level, even if operating out of multiple workplaces. Our data does not allow us to control for firms' policy effects on on-the-job training. It must also be noted that the results in this paper pertain to the incidence of on-the-job training. While these results are revealing, ideally they would be supplemented with an assessment of training intensity. Space considerations prevent us from undertaking this analysis in this paper. Also, an exploration of the value of training for worker's employability and workplace productivity would also be beneficial. Our data does not allow us to examine these issues.

3.e. Sample Characteristics

The weighted WES dataset essentially represents the Canadian labour market. As such, the following sample characteristics are generally consistent with other recent sources, and common knowledge. Descriptive statistics for the independent and control variables are presented in Table 2 and 3, respectively. Note also that no data adjustments have been made in this paper to account for known populations.

As presented in Table 2, one third of workers are in a workplace that implemented new information technology in the past year, while two thirds are in a non-implementing workplace. Almost two in five are in a non-innovating workplace. Conversely, one quarter are employed by a very high level innovator. The remainder are fairly evenly split among low, medium, or high level innovators. Over half of the workers are employed in a workplace facing regional competition, while one-fifth are in workplaces facing only local competition. Surprisingly, only 15% are in workplaces facing worldwide competition, leaving only a very small proportion in workplaces facing no competition.

< Insert Table 2 here >

We now turn to the control variables presented in Table 3. The average number of employees per workplace is 412. About 43% of individuals are employed in workplaces with fewer than 30 workers. Roughly speaking, about 20% of workers are employed in each of small, medium, and large workplaces. The average for workplace part-time and temporary worker rate is 28% and 12%, respectively. Almost two-thirds of workers are in the service sector, with one-third in manufacturing and related, leaving only a very small proportion in primary industries. More than four-fifths of workers have been categorized as regular full-time. The proportions for regular part-time, temporary full-time, and temporary part-time variables, are 12%, 2%, and 3%, respectively. About 28% of workers are covered by a collective agreement. In terms of human capital variables, more than two-thirds have some post-secondary education, with the majority of those being in a form other than a university degree. About 18% have (only) completed high school, leaving about 11% with less than high school education. Slightly more than one-fifth of workers are in lower level white-collar occupations, while close to half are in blue-collar jobs.

The remainder are evenly split between managers and professionals (15% management and 16% professional occupations). The average full-time work experience is 16 years.

In terms of personal characteristics of the sample, slightly more than half of the workers are female. About a third are single and more than two-thirds are married or in a common-law relationship, and slightly less than half have dependent children. In terms of ethnicity, roughly 85% listed themselves in the White ethnic group, 13% reported that they were members of the Visible Minority ethnic group, and 2% listed themselves as the Aboriginals ethnic group. In terms of immigrant status, 83% of respondents are Canadian-born, i.e. non-immigrant, and the rest are immigrants, with the majority of immigrants having arrived in Canada prior to 1990.

< Insert Table 3 here >

4. Results

4. a. Descriptive statistics of the incidence of on-the-job training

As shown in Table 4, 30% of workers received on-the-job training in the past year. Employees in workplaces that have implemented new information technology in the past year have higher on-the-job training incidence than those in non-implementing workplaces. While the difference is rather small at only 33% versus 29%, the relationship is in the expected direction. As presumed, the proportion taking on-the-job training steadily rises as the innovation level of their workplace rises. Across the five groups, the proportion receiving training rises from a low of 28% for those in non-innovating workplaces to a high of 36% among those working for very high innovators. As shown in Figure 2, the upward trend of these proportions is clear. The role played by competition level is potentially more complicated. In workplaces with no or only local competition, one quarter of workers took on-the-job training. That rises to slightly less than a third among those in workplaces facing regional competition, and slightly more than one third

among those in workplaces facing worldwide competition. This result suggests that workplaces facing stiffer competition provide more training to their employees. These proportions are also shown in Figure 3.

< Insert Table 4 here>

< Insert Figure 2 here>

< Insert Figure 3 here>

We also explored whether there is an interaction effect, on on-the-job training, between the implementation of new information technology, innovation introduced in the workplace, and competition experienced. These results are shown in Table 5. Only 16% received on-the-job training among those in workplaces that did not adopt new technology, are non-innovators, and that do not face competition. At the other end of the spectrum, 42% received on-the-job training among those in workplaces that implemented new information technology, are very high innovators, and face worldwide competition. Thus, based on descriptive statistics, it is fair to say that there seems to be a positive relationship between on-the-job training and new information technology, innovation, and/or competition.

< Insert Table 5 here>

4. b. Correlations between independent variables and on-the-job training in Canada

Correlations between on-the-job training and the independent variables are presented in Table 6. All are statistically significant. Due to the sample size of the dataset, many correlations will be statistically significant even if not substantive. Thus, when assessing this table, we suggest that the magnitude of the correlation should also be considered.

The incidence of on-the-job training is positively correlated with the implementation of new information technology (at .04), and with the innovation introduced in the workplace (at .07).

Also, on-the-job training is negatively correlated with no competition (at -.03) and only local competition (at -.06), but positively correlated with regional (at .01) and worldwide competition (at .04). While these correlations are small, the pattern is clear and in line with expectations. It is also revealing that new information technology is positively (and strongly) correlated with innovation (at .20) and with higher levels of competition (at .09 and .11). Innovation is also positively correlated with higher levels of competition (at .10 and .15). As presumed, then, there appears to be an inter-relationship between the three independent variables. Also, the bivariate correlations are consistent with the earlier presented descriptive statistics. That is, on-the-job training is positively correlated with the implementation of new information technology, innovation introduced in the workplace, and competition faced by the workplace. (As an aside, correlations between the four competition variables are strongly negative because these categories were designed to be mutually exclusive.)

< Insert Table 6 here >

4. c. Multivariate analysis

As presented in Table 7, only one of the independent variables is statistically significant. The innovation introduced in the workplace is significantly and positively associated with on-the-job training for workers. Although those employed in workplaces that implemented new information technology have somewhat higher likelihood of training, the result is not significant. Also, none of the competition variables are significantly associated with on-the-job training. Nonetheless, relative to those in workplaces facing regional competition, those in workplaces facing less competition have a lower incidence of training while those in workplaces facing worldwide competition had a higher incidence. It is worth noting that the direction of the effect

of each of the independent variables is in the expected direction, even though only one is statistically significant.

Turning to control variables, only the ones with significant effects are discussed. Those employed in small workplaces are more likely to receive on-the-job training relative to the reference large workplaces, while those in the other three groups are statistically inseparable. The regression also showed that, although not statistically significant, the size of the workplace is positively associated with on-the-job training, except in very small workplaces. The results suggest that temporary part-time workers are the most likely to receive training, although the difference with those in regular full-time and/or regular part-time jobs is not significant.

Temporary full-time workers have significantly lower likelihood of receiving training than the other three groups. These workers essentially have half the likelihood or less of receiving on-the-job training relative to all others. The other control variables that significantly impact on-the-job training are marital status, education, and occupation. Those not in married/common-law relationships are about one quarter more likely to receive on-the-job training. Relative to those with less than high school education, those with some post-secondary education or those who have a university degree or higher are both significantly (i.e. 40%) more likely to receive on-the-job training. Also, blue-collar workers are roughly 20% less likely to take training than professionals. Other occupational differences as well as collective agreement coverage are relatively small and insignificant.

< Insert Table 7 here >

A “sensitivity case” regression model was also generated including the two interaction variables depicted earlier in Table 5. One captures the effect of those employed in a workplace that did

not adopt new information technology, were non-innovators, and faced no competition. The other captures the effect of those employed in a workplace that adopted new technology, were very high innovators, and faced worldwide competition. Results of this analysis are presented in Table 8. Due to the large number of variables in this model, coefficients for the control variables are not included in the table, although they are included in the analysis.

Results provide more definitive indications that the independent variables have an effect on the incidence of on-the-job training. That said, the implementation of new information technology continues to have a small, positive, but insignificant effect on a stand-alone basis. However, innovation continues to be a significant positive determinant of on-the-job training.

Interestingly, the odds ratios indicate that the receipt of on-the-job training is approximately equal among those within workplaces facing no, regional, or worldwide competition. This is surprising, but is clarified when the effects of the interaction variables are reviewed. Those within workplaces facing only local competition have significantly lower incidence of training (on the order of almost 20%).

Finally, we turn to the interaction variables. The incidence of those in a workplace that did not adopt new information technology, were non-innovators, and face no competition were less than half as likely as others to receive on-the-job training. This large gap, not surprisingly, is statistically significant. Thus, we can say with confidence that the interaction of the three independent variables does affect the receipt of on-the-job training. As presumed, the incidence of training is tangibly higher (by 27%) among those in a workplace that adopted new technology, were very high innovators, and who face worldwide competition. Although this gap was substantive, it was not statistically significant.

< Insert Table 8 here >

5. Conclusions

Economic growth and prosperity as well as inclusion and equality can be achieved by providing opportunities for all Canadians to learn and develop their skills and abilities. It is now accepted that learning has to take place throughout one's life, in order to be employed, earn well and contribute to the society. At the same time, a well-trained workforce is likely to be a productive workforce, thereby providing benefits for employers as well. In this paper we are interested in showing the factors that affect on-the-job training. Our purpose is to examine the effects of implementing new information technology, innovation introduced in the workplace, and competition experienced by the workplace on on-the-job training. Our rationale is that, on average, inventive employers (i.e. those more willing and able to implement new information technology or other innovations)- and/or those facing substantial competition- would be likely to develop a highly trained workforce. Thus, we expected that technology adoption, the introduction of innovation, and competition would be positively associated with training.

Results show that in 1999 only 30% of workers in Canada received on-the-job training. Thus, more than two thirds of workers did not receive this type of training during the specified one year period. This finding confirms that receiving on-the-job training is far from universal. On the contrary, the majority of workers do not get the skills to be more productive or update their skills on a continuous basis. The results reveal that 42% received on-the-job training among those in workplaces that implemented new information technology, are very highly innovative, and face worldwide competition. At the other end of the spectrum, only 16% received on-the-

job training among those in workplaces that did not implement new information technology, are non-innovators, and did not face any competition. This suggests the importance of these three workplace characteristics affecting the workplace on-the-job training decisions. More generally, the other descriptive statistics and bivariate correlations suggested that the three independent variables are positively related to each other, and that all are positively associated with on-the-job training. For instance, the proportion of workers taking on-the-job training steadily rises as the innovation level of their workplace rises, from a low of 28% for those in non-innovating workplaces to a high of 36% among those within very high innovators.

Results from our multivariate analyses showed that when examined separately and controlling for many other factors, only the innovation variable significantly affected the receipt of on-the-job training. That said, the direction of the effect of the implementation of new information technology and competition, while insignificant, was in the expected direction (i.e. positive). Workers in a workplace that did not adopt new information technology, were non-innovators, and face no competition were less than half as likely as others to receive on-the-job training. Thus, we can say with confidence that the *interaction* of the three independent variables significantly affects the receipt of on-the-job training. Conversely, the incidence of training is tangibly higher (by 27%) among those in a workplace that adopted new technology, were very high innovators, and who face worldwide competition, but this gap was not statistically significant.

A deeper exploration and a better understanding of the on-the-job training practices that we provided above can assist policy advisors and analysts in the development of policies and

programs aimed at achieving the highly qualified skilled workforce needed for a country's success in the global economy. These policies must necessarily include continuous renewal and upgrading of skills of the workforce in order to sustain these achievements, while at the same time ensuring equal opportunity for skills enhancements. Our results can also assist all interested stakeholders: employers, unions, and individual workers in developing training programs.

Viewed as a set, the results provide sufficient support that the implementation of new information technology, innovation introduced, and the competition experienced by the workplace are positively associated with the incidence of on-the-job training. The corollary, then, is that less inventive employers, and/or those facing less competition, appear to underinvest in training relative to others. In turn, this has negative implications for their workers and the society, in addition to themselves. In essence, the findings from this study imply that there is an underlying strategic element to the provision of of-the-job training within some workplaces. Those that are inventive and/or face intense competition are likely to provide more on-the-job training than workplaces that are less inventive, or face less competition. Thus, our findings are conceptually similar to the "high performance" literature which has documented how some employers are strategically choosing to develop a highly involved, motivated, skilled/trained workforce as a way to respond to a competitive and rapidly evolving business environment (see, for instance, Godard and Delaney, 2000 and Delaney and Godard, 2001). In essence, providing on-the-job training to employees is a sign that employers might have a "high road" approach to labour (see Verma and Chaykowski, 1999).

Table 1: Description of Dependent, Independent and Control Variables

<u>Variable Description</u>	<u>Question, Coding</u>
Dependent variables	
Incidence of (received) on-the-job training	In the past 12 months, have you received any on-the-job training related to job? 1= Yes, 0= No
Independent variables:	
Implemented new information technology (adoption of software application and hardware)	Between April 1 st last year and March 31 st this year, has your workplace implemented a major new software application and/or hardware installation? Here we are speaking of hardware installations or entirely new applications, not upgrades. In either case, the implementations would affect at least half of the users in the workplace or a department within the workplace. 1= Yes, 0=No
Innovation introduced in the workplace (A composite measure)	Between April 1 st last year and March 31 st this year, has this workplace introduced new goods and services? New goods and services differ significantly in character or intended use from previously produced goods and services. Between April 1 st last year and March 31 st this year, has this workplace introduced improved goods and services? Improved goods and services are those whose performance has been significantly enhanced or upgraded. Between ... new processes? New processes included the adoption of new methods of goods production or service delivery. Between ... improved processes? Improved processes are those whose performance has been significantly enhanced or upgraded. Added variable values to create an 'innovation introduced' variable (4= very high level innovators (said yes to all), 3= high level innovators (said yes to three), 2= middle level innovators (yes to two), 1= low level innovators (yes to one), 0= non-innovators (said no to all).
Competition experienced by the workplace	To what extent do these firms offer significant competition to your business? Significant competition refers to a situation where other firms' market products/services similar to your own which might be purchased by your customers.

Table 1 Continues...

No competition	1= have no competition (i.e. workplace does not directly compete with locally, Canadian, or internationally-owned firms); 0=Otherwise
Only local competition	1= workplace competes with locally owned firms, but not with Canadian-, [U.S.-] or internationally-owned firms; 0=Otherwise
Regional competition	1= workplace has regional (North American (Canadian- or [U.S.-] owned firms) competition), but does not face worldwide competition; 0=Otherwise (reference group)
Worldwide competition	1=Yes, workplace competes with locally, Canadian, US, and internationally-owned firms; 0=Otherwise Note: the wording was somewhat ambiguous in the response options to the competition questions.
Control variables:	
Workplace characteristics:	
Size of the workplace	1=Yes, very small, 0= Otherwise
Very small<29	1=Yes, small, 0=Otherwise
Small (30-99)	1=Yes, medium, 0=Otherwise
Medium (100-499)	1=Yes, large, 0= Otherwise (reference)
Large 500+	
Workplace part-time worker rate	Total number of part-time employees receiving a T4 slip at the workplace in the last pay period divided by total employment at the workplace in the last pay period of March 1999 (% part-time)
Workplace temporary worker rate	Total number of temporary (i.e. non-permanent) employees receiving a T4 slip at the workplace in the last pay period divided by total employment at the workplace in the last pay period of March 1999 (% temporary)
Industry: (Derived from dom_ind)	
Primary sector (forestry & mining)	1=Yes, 0=Otherwise
Manufacturing & related sector (including construction, transportation, warehousing, wholesale, communication and other utilities)	1=Yes, 0=Otherwise (Reference group)
Service sector (Retail trade and consumer services, finance and insurance, real estate, rental and leasing, business services, education and health services, information and cultural industries)	1=Yes, 0=Otherwise

Table 1 continues...

Job characteristics:	
Employment status	
Regular full-time (RFT)	Regular employee with no contractual or anticipated termination date working 30 hours or more per week, 1=Yes, 0= Otherwise; Core employment (reference group)
Regular part-time (RPT)	Regular employee with no contractual or anticipated termination date working less than 30 hours per week, 1=Yes, 0= Otherwise; periphery employment
Temporary full-time (TFT)	Casual or on-call employee, or term employee where current term of employment will end at a specified date and working 30 hours or more per week. 1=Yes, 0=Otherwise; periphery employment
Temporary part-time (TPT)	Casual or on-call employee, or term employee where current term of employment will end at a specified date and working less than 30 hours per week. 1=Yes, 0=Otherwise; periphery employment
Work Characteristic:	
Collective agreement coverage	In current job, member of a union or covered by a collective bargaining agreement, 1=Yes, 0=No
Human capital characteristics:	
Highest education attained :	
Less than high school	1=Yes, 0= Otherwise (reference group)
Completed high school	1=Yes, 0= Otherwise
Some post-secondary (including degree/certificate/diploma but excluding university degree)	1=Yes, 0= Otherwise
University degree or higher	1=Yes, 0= Otherwise
Occupation:	
Managers	Ocp_grp: 1=Managers
Professionals	Ocp_grp: 2=Professionals, reference group
Lower white collar	Ocp_grp: 4=Marketing/Sales OR
Blue collar	5=Clerical/Administrative
	Ocp_grp: 3=Technical/trades OR 6= Production Worker with No Trade/ Certification
Full-time work experience	Number of years
Full-time work experience Squared	Number of years squared
Personal characteristics	
Gender	1=Female, 0=Male
Marital status:	
Single (single, separated, divorced, widowed)	1=Yes, 0=Married/Common law marriage

Table 1 continues...

Dependent children	1= Yes, have dependent children, 0= No
Ethnicity (Implied meaning of these groups is categorizing Canadians according to race and ethnicity)	Canadians come from various ethnic, cultural and racial backgrounds. From which group did your parents or grandparents descend?
Visible Minority	EthB= Includes Arab, Black, Chinese, East Indian, Filipino, Japanese, Korean, Latin American, North African, South East Asian & West Asian, excluding EthAB, 1=Yes, 0=Otherwise
Aboriginal	EthAB= Includes Inuit, Metis, North American Indian (First Nations, Aboriginal, Native Peoples), 1=Yes, 0=Otherwise
White	EthA= Canadian, British, French or Other European, 1=Yes, 0=Otherwise (reference group)
Immigrant Status	1= Immigrant (Not born in Canada), 0= Born in Canada
Immigrated in/after 1990	Pre-1990 Immigrant=Immigrated before 1990, 1=Yes, 0=No Recent Immigrant=Immigrated in or after 1990, 1=Yes, 0=No

Table 2: Descriptive Statistics of Independent Variables

<u>Variable Label</u>	<u>Percent</u>
Implemented new information technology	35.0
Innovation introduced in the workplace	
Non-innovator	38.0
Low level innovator	10.5
Middle level innovator	14.9
High level innovator	11.9
Very high level innovator	24.7
Competition experienced by the workplace	
No competition**	6.6
Only local competition**	21.2
Regional competition**	57.5
Worldwide competition**	14.7

Sample: All workers, except as noted.

** Percentages exclude system-missing cases.

Table 3: Descriptive Statistics of Control Variables

<u>Variable Label</u>	<u>Mean</u>	<u>StdD</u>	<u>Percent</u>
Size of the workplace:			
Workplace size (# of employees)	412.16	1144.49	
Workplace size (logform)**	1.79	0.86	
In a very small workplace			42.9
In a small workplace			20.1
In a medium workplace			20.1
In a large workplace			16.9
Workplace part-time worker rate	0.28	0.29	
Workplace temporary worker rate	0.12	0.22	
Industry sector:			
Primary			1.7
Manufacturing & related			33.6
Service			64.7
Employment Status:			
Regular, full-time (RFT)*			83.4
Regular, part-time (RPT)*			11.6
Temporary, full-time (TFT)*			2.4
Temporary, part-time (TPT)*			2.6
Collective agreement coverage			27.9
Education:			
Less than high school			10.7
Completed high school			17.5
Some post-secondary			52.4
University degree or higher			19.5
Occupation:			
Managers			15.1
Professionals			16.2
Lower white collar			22.4
Blue collar			46.4
Full-time work experience	16.17	10.71	
Full-time work experience squared	376.14	421.58	
Gender: Female			52.1
Marital Status: Single			30.9
Has dependent children			47.2
Ethnicity:			
Group B (Visible minority)			13.0
Group AB (Aboriginal)			1.8
Group A (Other)			85.2
Immigrant Status:			
Immigrant			17.5
Recent immigrant (since 1990)			3.5

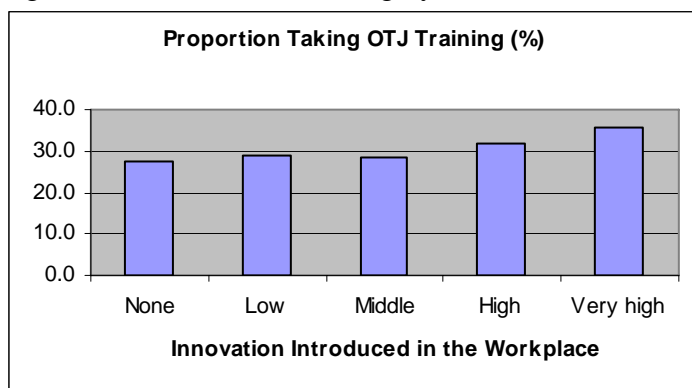
Sample: All workers. *Percentages exclude missing and other cases. ** Percentages exclude system-missing cases.

Table 4: On-the-job Training Received

	<u>Percent</u>
All workers	30.3
By implementation of new information technology	
Did not implement	29.1
Implemented	32.5
By innovation introduced in the workplace	
Non-innovator	27.5
Low level innovator	28.9
Middle level innovator	28.3
High level innovator	32.0
Very high level innovator	35.5
By competition level	
No competition	25.0
Only local competition	24.8
Regional competition	30.8
Worldwide competition	34.5

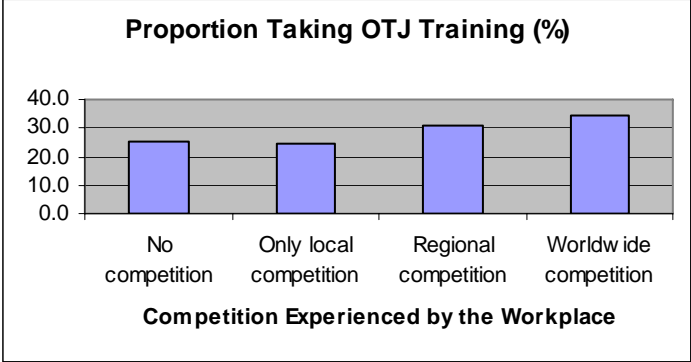
Sample: Excludes those not belonging to one of four specified employment status groups. On a weighted basis this is 2.4% of the observations.

Figure 1: On-The-Job Training by Innovation Introduced



Sample: Excludes those not belonging to one of four specified employment status groups. On a weighted basis this is 2.4% of the observations.

Figure 2: On-The-Job Training by Competition Experienced



Sample: Excludes those not belonging to one of four specified employment status groups. On a weighted basis this is 2.4% of the observations.

Table 5: On-The-Job Training Received by Implemented New Technology, Innovation Introduced in the Workplace and Competition Experience

	<u>Percent</u>
Employees in workplaces that: did not implement new information technology, were non-innovators, and face no competition.	15.8
Employees in workplaces that: implemented new information technology, were very high innovators, and face worldwide competition.	41.7

Sample: Excludes those not belonging to one of four specified employment status groups. On a weighted basis this is 2.4% of the observations.

Table 6: Bivariate Correlations among On-the-Job Training and Independent Variables

	<u>Variables</u>	1	2	3	4	5	6
1	OTJ Training						
2	Implemented new information technology	0.04					
3	Innovation introduced in the workplace	0.07	0.20				
	Competition experienced by the workplace						
4	No competition	-0.03	-0.08	-0.08			
5	Only local competition	-0.06	-0.12	-0.15	-0.13		
6	Regional competition	0.01	0.11	0.10	-0.28	-0.60	
7	Worldwide competition	0.04	0.09	0.15	-0.11	-0.22	-0.49

Note: All correlations are significant at $p < .01$ (two-tailed).

Sample: Excludes those not belonging to one of four specified employment status groups. On a weighted basis this is 2.4% of the observations.

Table 7: Determinants of the Incidence of On-The-Job Training

	Odds Ratio	Regr. Coef.	Std. Error	Sig.
<u>Independent Variables:</u>				
Implemented new Information technology Innovation introduced in the workplace	1.122	0.115	0.078	
Competition experienced by the workplace	1.076	0.074	0.023	***
No competition	0.833	-0.183	0.168	
Only local competition	0.834	-0.182	0.118	
Regional competition (ref.)				
Worldwide competition	1.135	0.127	0.103	
<u>Control Variables:</u>				
Size of the workplace				
Very small workplace	0.832	-0.184	0.115	
Small workplace	1.303	0.265	0.103	***
Medium workplace	1.122	0.115	0.093	
Large workplace (ref.)				
Workplace part-time worker rate	1.332	0.287	0.187	
Workplace temporary worker rate	0.737	-0.306	0.242	
Industry				
Primary sector	1.185	0.170	0.126	
Manufacturing & related sector (ref.)				
Service sector	0.932	-0.071	0.073	
Employment Status				
Regular full-time(ref.)				
Regular part-time	0.924	-0.079	0.110	
Temporary full-time	0.430	-0.844	0.235	***
Temporary part-time	1.241	0.216	0.200	
Collective agreement coverage	0.987	-0.013	0.081	
Education				
Less than high school (ref)				
Completed high school	1.238	0.214	0.153	
Some post-secondary	1.449	0.371	0.128	***
University degree or higher	1.395	0.333	0.143	**
Occupation				
Manager	0.955	-0.047	0.126	
Professional (ref.)				
Lower white collar	0.865	-0.145	0.105	
Blue collar	0.822	-0.196	0.093	**
Full-time work experience	1.001	0.001	0.010	
Full-time work exp. squared	1.000	0.000	0.000	
Gender (female)	1.107	0.101	0.068	
Marital Status				
Single	1.238	0.213	0.078	***
Has dependent children	1.085	0.081	0.080	

Table 7 continues...

Ethnicity				
Group B	0.908	-0.097	0.122	
Group AB	1.253	0.226	0.242	
Group A (ref.)				
Immigrant Status				
Immigrant	0.839	-0.176	0.108	
Recent immigrant (since 1990)	0.926	-0.076	0.187	
constant		-1.169	0.227	***
	Number of observations	22,179		
	Wald Chi-sqr	171.320		
	Prob > chi-sqr	0.000		

Note: Significance levels: *** $p < .01$, ** $p < .05$

Sample: Excludes those not belonging to one of four specified employment status groups. On a weighted basis this is 2.4% of the observations.

Table 8: Determinants of the Incidence of On-the-Job Training with Interaction Variables Included

	Odds Ratio	Regr. Coef.	Std. Error	Sig.
<u>Independent Variables:</u>				
Implemented new Information technology Innovation introduced in the workplace	1.092	0.088	0.080	
Competition experienced by the workplace	1.063	0.061	0.024	**
No competition	1.101	0.096	0.231	
Only local competition	0.819	0.200	0.119	*
Regional competition (ref.)				
Worldwide competition	1.089	0.085	0.127	
<u>Interaction Variables:</u>				
Employees in workplaces that: did not implement new information technology, were non-innovators, and face no competition.	0.486	0.721	0.283	**
Employees in workplaces that: implemented new information technology, were very high innovators, and face worldwide competition.	1.267	0.237	0.226	
<u>Control Variables:</u>				
suppressed due to space restrictions				
constant		1.134	0.230	***
Number of observations	22,179			
Wald Chi-sqr	180.160			
Prob > chi-sqr	0.000			

Note: Significance levels: *** p <.01, ** p <.05

Sample: Excludes those not belonging to one of four specified employment status groups. On a weighted basis this is 2.4% of the observations.

Control variables are included in the analysis but not presented due to space restrictions.

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