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Worker control and workplace learning: Expansion of the Job Demand-Control Model

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Abstract:

This paper uses a sub-sample (N=5800) of a unique dataset on work and lifelong learning to develop the learning dimension of the Job Demand-Control model (Karasek, 1979). The model is expanded by including three distinct learning behaviors to allow for a complete assessment of workplace learning. Worker control is also expanded to include often confounded dimensions of Social and Technical Control. The results confirm that different types of learning are related to different determinants and that Social and Technical Control are key factors in learning participation.

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Introduction

Adults participate in a remarkable number of learning activities. In Canada the majority of adults have a form of post-secondary certification (Statistics Canada, 2005), at least one-third participate in Further Adult Education outside of registered school programmes (Statistics Canada, 2004) and 85 per cent are involved in some form of informal learning (Livingstone, 2005). This learning occurs across the inter-related spheres of volunteer work, unpaid housework, general interest, and paid employment as adults actively seek answers and solutions to daily problems and challenges. In the knowledge-based economy, fully understanding the paid workplace component of this learning is important because of increased emphasis on keeping the workforce current through life-long learning and leveraging the intellectual capital of workers. A key starting point is that adults engage in targeted learning where they learn what they need to know when they need to know it. As such, the workplace environment and job structure play considerable roles in the motivation to undertake learning activity. Two workplace factors are often reported to influence learning: the level of demand in one's job; and the level of discretionary control that one holds over that job. However, the reports from these studies (discussed subsequently) vary because the conceptualizations of learning activity are diverse and sometimes incomplete. Adults take the learning path of least resistance and participate in learning actions most suited to their particular problem. For most, this learning is informal in nature. Informal learning in the workplace has largely been overlooked due to the focus on traditional human capital measures such as educational attainment and/or formal learning such as employer-sponsored training.

This research used a sub-sample of the Work and Lifelong Learning (WALL) dataset which was compiled through a cross-Canada survey in 2004. This dataset is unique and one of kind because it was designed specifically to capture a wide-range of adult learning activities and the Social and technical relations of work environments. Therefore, this dataset makes it possible to expand a model of job characteristics and workplace learning and better describe the learning in which workers participate and the conditions under which specific learning occurs. The framing model is the Job Demand-Control (JDC) model (Karasek, 1979) which has often been used to link job demand and worker control to health-related outcomes. The learning dimension of the model has been underutilized in the literature and some measures of learning and control have not fully captured the dynamic of work and learning relations. Consequently, this paper fills a key gap in the literature.

This paper also makes important and novel contributions to the literature on workplace learning by: (1) focusing on direct measures of learning activity that include formal and informal activities; (2) unpacking job control into its social and technical dimensions. In so doing this study documents the associations between learning behaviors and workplace control more comprehensively than prior research.

Conceptual Framework

Learning Definitions, Distinctions and Implications. Knowledge and abilities are still traditionally defined (and therefore acquired and rewarded) via a formal and institutionalized system of teachers and learners. However, this formal learning is only the tip of the iceberg of adult learning activities (Tough, 1978). Adults are continuously learning as they engage the changing landscapes in which they live. For a growing number of people a portion of learning

will take place within formalized institutions and systems, but for all adults the larger portion of learning is a constant and sometimes unconscious part of everyday life. It is important to delineate these learning spheres because there is growing evidence that formal and informal learning activities are quite distinct. The degree of difference is pervasive and includes, for example, the value placed on types of learning activity by society and by individuals in particular situations, the recognition and rewards that accompany types of learning, and the incidence of one type of learning versus another (see Burns, 1999; Colardyn and Bjornavold, 2004; Gereluk, Briton and Spencer, 1999; Kusterer, 1978; Livingstone, 2005; Livingstone and Sawchuk, 2004; Livingstone and Scholtz, 2006).

Therefore, a complete conceptualization of 'learning' includes four components: 1) organized formal schooling, 2) Further Adult Education, 3) Informal Education, and 4) Non-taught Learning (Livingstone, 2003; see Figure 1). *Formal schooling* is characterized by a set curriculum taught to learners by authorized teachers such as K to 12 schooling, college and university. This learning is not included as a dependent variable in the following analysis as it typically occurs before individuals enter the workforce -- although an increasing number of workers do return to school for part-time studies (see further comment at Endnote 3). *Further Adult Education* also relies on an organized curriculum and teacher, but emphasizes the motivation and willingness of the adult learner as opposed to the child in a school setting. From the WALL survey used in this analysis, examples include job-related employer-sponsored training and other courses, workshops, seminars or on-line modules. *Informal Education* refers to situations where mentors, teachers or tutors work with learners in more spontaneous and incidental learning situations without reference to a specific curriculum. On the WALL survey respondents were asked: "In the past four weeks did you seek advice from someone

knowledgeable with the intention of developing your job skills?" *Non-taught Learning* includes all other individual or group learning experiences that occur without the presence of a set curriculum or identified 'teacher'. These activities can be intentional acts of learning or unintentional and tacit experiences of daily life (see Colardyn and Bjornavold, 2004; Colley, Hodkinson and Malcolm, 2003; Livingstone, 2001, 2005; Livingstone and Scholtz, 2005). For example, these activities could be reading a book, looking something up online, conversing with colleagues, solving problems, or making and correcting mistakes. Respondents to the WALL survey were asked a whether they had participated in a range of work-related informal learning from general learning about new equipment to specific topics such as health and safety.

The WALL dataset provides a unique opportunity to address the incidence of, or participation in, formal and informal learning activity rather than the outcomes or product of learning (i.e., mastery or self-efficacy). This expansion of the learning variable and the focus on direct participation in learning activity differentiates this study from others in this area.

Unpacking the Concept of Job Control: Social and Technical Aspects. Another distinction that differentiates this study from others in the literature is the explicit use of job control as a multi-dimensional construct. The bulk of research in this area defines job control one-dimensionally as the decision latitude or freedom that workers hold in their jobs. It is generally measured by the amount of control or discretion that they have over their own or others' work activities (Karasek, 1985; Karasek, 1979; Van der Doef and Maes, 1999). Such use potentially confounds two distinct aspects of job control: Social Control and Technical Control. This distinction follows from the recognition of the labor process as one involving both social and technical relations of production that can work singularly and together to dictate the landscape of work environments (see for example, Braverman, 1974; Giddens, 1973; Zimbalist, 1979). In

their study on perceived class consciousness, McNamee and Vanneman (1983) adopt three dimensions of social relations: economic (ownership), political (authority), and ideological (the distinction between mental labor and manual labor - managerial). They also use two dimensions of technical relations: symbolic (workers' relationships to information) and material (workers' relationships to machines). As such, social and technical relations are actually manifests of Social and Technical Control. Social Control is defined as control over people and the larger work system and encompasses ownership, authority and managerial roles. Technical Control is the control over tools and tasks and includes the discretion workers have to shape and perform their own work. This distinction is made throughout the rest of the paper and these definitions are revisited when the variables for this study are discussed.

Reviewing a Model of Learning and Job Control

Activity theory (see Leont'ev, 1978; Vygotsky, 1978; Engstrom, Miettinen and Punamaki, 1999) states that humans are goal directed and learning oriented; they engage in activity (often learning) to achieve goals and solutions. As workers address these goals through learning activity they use various tools and are influenced by the community (i.e., peers, supervisors), the rules (i.e., social and organizational) and the division of labor (i.e., workplace structures) of their realm of activity. In this way the level of control that workers have over their jobs will dictate how, when, and if they use certain tools and also how they interact with the people, norms and structures around them. "Control offers active engagement with the problem domain on which learning and solutions depend." (Hacker, Skell and Staruab, 1968 as cited in Holman and Wall, 2001, p. 285)

The bulk of research that links learning and job control is from applications of the Job Demand-Control Model (Karasek, 1979, Karasek and Theorell, 1990). The more popular *strain* dimension has been extensively applied to the association between job characteristics and worker health (see Schnall, Landsbergis and Baker, 1994; Kristensen, 1995; De Jonge and Kompier, 1997; Van der Doef and Maes, 1999; De Lange, Taris, Kompier, Houtman and Bongers, 2003). The largely overlooked *learning* dimension also predicts a dynamic relationship between job demand, job control and learning activity (Karasek, 1979). Situations in which high job demand (measured by stressors such as workload demand, time pressure, role conflict and workplace change) is matched with high job control (measured primarily by aspects of Technical Control) may trigger increased learning, motivation and development of skills (Karasek and Theorell, 1990). Low job demand and low job control combine to produce a decline in activity and motivation (Karasek, 1979).

A review of recent studies highlights a problem with testing the learning dimension of the JDC model: the concepts and variables used to operationalize learning are quite varied. As pointed out in the literature, Karasek and Theorell (1990) are themselves unclear as to the concepts that should be used to test the learning dimension (Taris, et al., 2003). The result is burgeoning research that is moving in several directions. Some studies focus on perceived outcomes of learning such as efficacy or mastery (Parker and Sprigg, 1999; Dollard, Winefield, Winefield and De Jonge, 2000; Taris, et al., 2003); others focus on the application of learning such as skill utilization (Holman and Wall, 2002) or the action of Informal Education such as talking to a supervisor about skill needs (Taris and Feij, 2004); and still others focus on occupation specific measures of learning (Kwakman, 2001). Other studies have used job satisfaction, job involvement and commitment, job challenge, and active coping as outcome

variables in studies of the JDC model learning dimension. However these variables have been deemed inappropriate proxies for learning (see Taris, et al., 2003 for a review).

Expanding the Model of Learning and Job Control

As outlined above, learning and job control have multiple components and each of these facets must be included separately in analyses to ensure complete and accurate assessments. As Holman and Wall (2002, p. 284) pointed out, it is often difficult to achieve measures of knowledge and skill development because, "employees develop knowledge or skill in vastly different areas," and this development is continually changing over time (see also Pankhurst and Livingstone, 2006). However, a more direct measure of learning is the level of participation in formal and informal learning activities themselves (i.e., whether a worker has taken courses or engaged in self-study on work-related topics). In many ways this measure is more directly applicable to work (re)design and the concept of the learning organization because it can connect actual time spent in learning activities with associated factors.

Similarly with job control, most studies have used measures that reflect the technical aspect of control (discretion and autonomy in one's own work), but have largely neglected the social aspect of control (broad decision-making authority and managerial roles) or have confounded the two in a single measure. It is important to acknowledge that a worker could hold power or control over their own technical tasks without occupying a position of social authority and vice versa. A true picture of control and a more accurate model for understanding the associations between control and learning will include separate measures of Social and Technical Control.

Based on the considerations presented above, it is hypothesized that both Social and Technical Control will be positively related to participation in each of: Further Adult Education,

Informal Education, and Non-taught Learning. Variables related to job demand are included to complete the JDC model, but since job control is the focal point of this article, relationships are not hypothesized and results not discussed in the body of the paper.

Data and Methods

This research utilized a sub-sample of the Work and Lifelong Learning (WALL) dataset[1]. The WALL telephone survey was conducted in 2004 with a large representative sample of the adult (18+) Canadian population (N = 9,063). It is unique and suited for this study in that it provides unprecedented quantitative detail on all spheres of learning, paid work activities, and their inter-relations. This allowed for the creation of comprehensive learning activity variables as well as the distinction between Social and Technical Control. Also, it provides a large heterogeneous sample of workers so findings can be applied to the general population. Many other studies that use the JDC model focus on specific occupations or specific sets of workers (i.e., nurses, teachers) that represent extremes on the predictor or outcome variables. For this analyses respondents who had never worked for pay or who had not worked for pay in the past twelve months were excluded. Self-employed individuals were included in the sample. The final sub-sample population was 5800[2].

The questions from the WALL survey for each learning variable were: (1) received partially or primarily job-related formal training or education during the past year (Further Adult Education)[3], (2) sought advice of someone knowledgeable in the past four weeks with the intention of developing job skills (Informal Education), and (3) engaged in employment-related informal learning in the past year (Non-taught Learning). Examples and prompts were used to clarify the definition of Non-taught Learning for respondents. A dummy variable (participated: yes or no) was created for each of the three learning variables and these were used as dependent

variables in three separate analyses. The job demand construct and the Social and Technical Control constructs are multi-item scales. The three job demand items for job demand were chosen based on the past empirical work outlined above and draw specifically on the notions of task complexity (Ellstrom, 1997), work pressure (Kwakman, 2001), changes in work content (Illeris, 2003) and technical change (Wallace, 2003). The items for Social and Technical Control were based on McNamee and Vanneman (1983). The discriminant validity of job demand measures and job control measures was analyzed using the maximum likelihood (ML) option in Comprehensive Exploratory Factor Analysis (CEFA)(Browne, Cudeck, Tateneni and Mels, 2004), employing oblique Direct Quartimin rotation to allow for the possibility of correlated factors (Ford, McCallum and Tait, 1986; Conway and Huffcutt, 2003). Using several measures of statistical fit (Conway and Huffcutt, 2003), and harmonizing with *a priori* expectations, a three-factor solution was deemed to be the best fit of the data[4]. One job demand item (Intellectual Demands) was eliminated due to its low factor loadings and communality estimates, and the remaining two-item scale was labeled 'Work Change'. The item questions, factor loadings and Cronbach alpha tests of internal validity are presented in Table 1. The final scales were constructed by summing the values of each item. Each item contributed equal weight to its respective scale.

Due to the binary nature of the dependent variables, logistic regression was used. Each analysis also included variables to control for known individual factors that can affect participation in learning: Educational Attainment (formal schooling), Age, Tenure, Hours of Work, Gender and Union Status (Cross, 1981; Courtney, 1992; Lin and Tremblay, 2003; Turcotte, Leonard and Montmarquette, 2003; Statistics Canada, 2004; Livingstone, 2005).

Results and Discussion

Descriptive statistics and a correlation matrix of all variables are provided in Table 2. For the job demand variables and both Social and Technical Control variables, low and high values on the scale indicate low and high job demand/control, respectively. Regression results for each of the three learning variables are presented in Table 3. Since the logit coefficients do not directly give the effects on the magnitude of the probabilities, marginal effects are also presented as percentage points and as percentages relative to the mean of each dependent variable.

Social Control has significant and positive relationships with Informal Education and Non-taught Learning. For example, a one standard deviation increase in social control (2.74) is associated with an increase of over 10 percent in the likelihood of participating in Informal Education (i.e., 2.74*3.8) and over 4 percent for Non-taught Learning, both relative to their respective means. Technical Control has a significant relationship only with Non-taught Learning. This relationship is positive such that a one standard deviation increase in technical control (2.06) is associated with a 3.5 percent increase in the probability of participating in Non-taught Learning relative to the mean. The raw survey data help to further illustrate these effects. Of the workers who are *not* engaged in Informal Education, 60% report lower than average levels of Social Control. Similarly, of the workers *not* engaged in Non-taught Learning, 70% have lower than average Social Control. Regarding Technical Control and engagement in Non-taught Learning, 67% of workers who are engaged also have higher than average levels of Technical Control.

These findings fit with the idea that informal learning is less structured and more interwoven with other daily activities than formal learning. Workers with more discretion over the organization and content of their work (Technical Control) and more authority to make decisions

or influence organizational or work group decisions (Social Control) will have more opportunity to engage with their work, confront obstacles and develop potential solutions to those obstacles. Compared to workers who follow rigid work structures, high Technical Control workers have more opportunity to ask a colleague for assistance, spend some time on-line or with a resource guide, use trial and error, or reorganize the problem/task in order to reach their goals. High Social Control workers are exposed to a larger problem domain or scope-of-work and have more opportunity to interact with and model the positive behaviors of others, and learn from their increased responsibility. It is with added job control that workers can seek their own personalized and experience-based solutions to problems or glitches and also better utilize their cumulative learning.

Social and Technical Control likely do not influence engagement in Further Adult Education in the same way because this learning is often not a personal choice. It is mandated professional development that is tracked and used for performance appraisals. As well, Technical Control refers to how you do your job -- how you organize it and plan it out. Workers who have discretion in this area are more likely to rely on informal, on-the-spot or situational learning (Hilton, 2001), as they work through daily tasks rather than take time for formal courses.

The finding that Technical Control influences engagement in Non-taught Learning, but not Informal Education, while Social Control influences both types of informal learning is also of interest. It is important to remember that the variable measuring Informal Education is whether workers have asked knowledgeable others for advice about developing their skills. The results may be uncovering a distinction between Social and Technical Control and the social or technical abilities that are being acquired through the learning activity. In this sample, workers with more Social Control are self-employed (owners), managers or supervisors, and/or workers

involved in policy and workflow decisions. These people are perhaps engaging in the mentoring and advice-seeking of Informal Education with an eye toward long-range development to advance in the social hierarchy. Workers seeking to acquire more Social Control are more cognizant of their ability gaps and may seek learning opportunities such as the Informal Education tested in this study, to clarify and overcome these gaps. This would be more likely to occur for Social Control than Technical Control because the everyday freedom to plan and organize daily work activities occurs primarily at the micro level and would be less likely to include such long-range forecasting and career planning.

Conclusion

Within the environment of the knowledge economy, it is important to understand the types of learning that are occurring in the workplace and to clearly determine the work characteristics that contribute to that learning. This research contributes to the study of workplace learning by expanding the Job Demand-Control (JDC) model (Karasek, 1979) to build a more nuanced picture of the role of both Social and Technical Control in engagement in formal and informal aspects of work-related learning. The Work and Lifelong Learning (WALL) dataset was integral to this study as it provided unparalleled access to quantitative detail about worker engagement in one aspect of formal learning (Further Adult Education) as well as two types of informal learning (Informal Education and Non-taught Learning). The WALL dataset also contained information on job characteristics that permitted the delineation of traditional measures of job control into social and technical aspects.

This study exploits the multi-dimenional natures of control and learning in the WALL to test an expanded version of the JDC model and finds that Job Demand, Social and Technical Control

are differentially associated with different learning types. This varies from earlier work that did not utilize these multidimensional measures. With respect to the learning dimension of the JDC model, Job Demand is positively associated with all three learning activities. Social Control is associated with both informal learning activities and Technical Control is associated with only Non-taught Learning.

These findings have several implications for organizations. First, workers report high levels of Work Change in their jobs and they rely heavily on all their resources in order to succeed. As such it is necessary to encourage and support a full gamut of learning opportunities through the provision of funding, time and recognition. In this sample 80% of the workers reported participation in Non-taught Learning related to their jobs, yet it is typically not a large part of formal recognition and reward structures. Second, worker participation in informal learning activities is tied to levels of Social and Technical Control. Increasing the decision-making authority and discretionary control that workers have in their jobs will allow for a closer link between learning activities and the work at hand. Increased Social and Technical Control allows learning to take place more easily within jobs and also ensures that the learning is timely, applicable and relevant. As a result, organizations will benefit from job redesign that increases the real Social and Technical Control of their workforce because workers will be better able to utilize their reserves of knowledge and ability thereby increasing the productivity, efficiency and applicability of their work.

Limitations and Additional Research. The dependent variables were single-item measures, but as participation in learning activity is a relatively specific and objective event, it is unlikely that additional questions or measures would have added value. One particular area of difficulty has been noted with accurately capturing the true incidence of Non-taught Learning because

much of it is tacit and easily unrecognized. However, the WALL survey was designed with some of these challenges in mind and respondents were asked about learning activity in a host of subject domains and prompted to realize all of their learning activities. The high mean value for Non-taught Learning activities indicates that this approach was successful. Other limitations were the risk of common method bias and causality which affect all cross-sectional survey analysis. Some research is moving into the area of applying longitudinal designs to the JDC model to test for changes over time (see Taris, et al., 2003; De Lange, et al., 2003; Taris and Feij, 2004) and also to link the learning and strain dimensions (Holman and Wall, 2001). Additional longitudinal research is necessary to understand how learning needs change over time and how differential learning needs and learning choices are impacted by the changing characteristics of work and the constraints of the work environment.

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FIGURE 1:
BREAKDOWN OF LEARNING INTO FORMAL AND INFORMAL DIMENSIONS

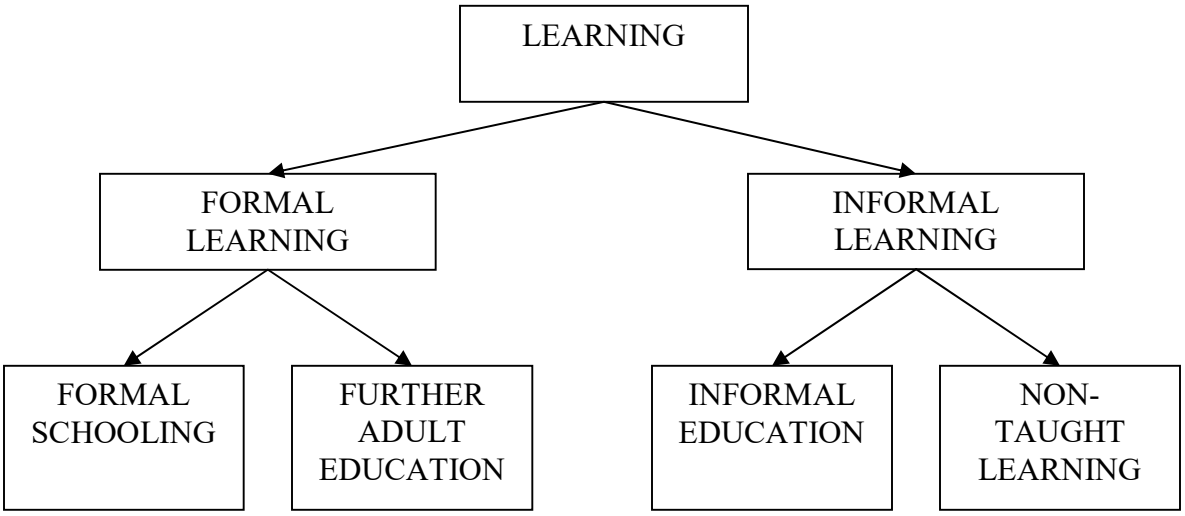

TABLE 1:
FACTOR LOADINGS FOR JOB CHANGE AND SOCIAL AND TECHNICAL CONTROL CONSTRUCTS

	Factor Loadings[a]		
	Work Change	Job Control	
Item		Social	Tech.
Intellectual demands: Thought or attention required of main job	0.25*	-0.04*	0.30*
Change in skill level required to perform your job	**0.63***	0.03	-0.05
Change in work techniques and equipment	**0.47***	0.02	-0.06
Participation in policy-making decisions - i.e., the services or products delivered, the number of people hired, budgets (political authority, social control)	0.05*	**0.65***	0.08
Measure of self employed and managerial status (economic and ideological, social control)	-0.01	**0.72***	-0.02
Ability to plan or design some aspects of your own or other people's work (symbolic, technical control)	0.003	0.03	**0.70***
Choice in the way you do your job (material, technical control)	-0.03*	0.14*	**0.60***
Cronbach alpha	0.50	0.70	0.60

NOTES. Information in parentheses is in reference to McNamee and Vanneman (1983). Factor loadings above the acceptable cut-off point of 0.32 (Tabachnick and Fidell, 2001) are bolded.

*Significant using a 90% confidence interval.

[a]Costello and Osborne (2005) suggest that factors with less than three items may be weak or unstable, however they also note that with large samples (such as in this case) reduced items may still result in strong factors.

TABLE 2:
DESCRIPTIVE STATISTICS AND CORRELATION MATRIX OF VARIABLES (OMITTED REFERENCE IN PARENTHESES)

	Mean (SD)	Range	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1. Further Adult Ed.	0.23 (0.42)	0-1	1.00														
2. Informal Education	0.37 (0.48)	0-1	.11*	1.00													
3 Non-taught Learning	0.80 (0.41)	0-1	.11*	.21*	1.00												
4 Intellectual Demand	4.42 (0.93)	0.7-5	.13*	.15*	.09*	1.00											
5. Work Change	7.39 (2.06)	1.7-10	.18*	.20*	.15*	.24*	1.00										
6. Social Control	4.85 (2.74)	2-10	.07*	.10*	.12*	.17*	.18*	1.00									
7. Technical Control	7.64 (2.06)	2-10	.09*	.11*	.13*	.30*	.22*	.43*	1.00								
8. Female	0.47 (0.50)	0-1	.02	.01	-.02	-.00	-.06*	-.15*	-.09*	1.00							
9. Age (yrs)	39.98 (11.74)	18-87	.04*	-.14*	-.08*	.08*	.11*	.18*	.11*	-.03*	1.00						
10. Tenure (yrs)	9.11 (9.03)	0-65	.04*	-.13*	-.05*	.04*	.13*	.14*	.11*	-.08*	.53*	1.00					
11. Hours/wk	40.25 (13.06)	0-96	.07*	.04	.02*	.14*	.10*	.20*	.10*	-.26*	.05*	.08*	1.00				
12. Union	0.30 (0.46)	0-1	.05*	-.03*	-.02	.02	-.02	-.30*	-.13*	.01	.06*	.16*	-.05*	1.00			
School (Primary)																	
13. Secondary	0.26 (0.44)	0-1	-.05*	-.02	-.01	-.06*	-.05*	-.06*	-.06*	.35*	-.10*	-.03*	-.08*	-.01	1.00		
14. College	0.35 (0.47)	0-1	.04*	.05*	.04*	.03*	.10*	-.00	.00	.02	.00	-.02	.00	.02	-.43*	1.00	
15. University	0.20 (0.40)	0-1	.13*	.08*	.08*	.08*	.12*	.10	.10*	.01	.02	-.03*	.02	-.01	-.29*	-.36*	1.00

NOTES. SD = standard deviation. The age range does not reflect the typical 18-65 years of the working population because inclusion was based on self-reports of employment status and not *a priori* assumptions about the age range of working people.

*Significant at 5 percent.

TABLE 3:
LOGIT COEFFICIENT ESTIMATES AND MARGINAL EFFECTS FOR JOB DEMAND AND SOCIAL AND TECHNICAL CONTROL ON THREE LEARNING TYPES

	Further Adult Education (mean = .21)			Informal Education (mean = .37)			Non-taught Learning (mean = .80)		
		marginal effect			marginal effect			marginal effect	
Variable	coefficient	percentage points	% relative to mean	coefficient	percentage points	% relative to mean	coefficient	percentage points	% relative to mean
Intellectual Demand	.238**	.039**	18.6	.247**	.057**	15.4	.077	.012	1.5
	(4.04)			(5.20)			(1.42)		
Work Change	.165**	.027**	12.8	.193**	.045**	12.2	.122**	.019***	2.4
	(7.41)			(9.48)			(5.11)		
Social Control	.020	.003	1.4	.062**	.014**	3.8	.078**	.012***	1.5
	(1.13)			(3.86)			(3.32)		
Technical Control	.033	.005	2.4	.041	.009	2.4	.085**	.013***	1.6
	(1.41)			(1.94)			(3.67)		
Female	.223**	.037**	17.6	.121	.028	7.6	-.034	-.005	-0.6
	(2.60)			(1.53)			(.35)		
Age (yrs)	.003	.000	0.0	-.026**	-.006**	-1.6	-.018**	-.003***	-0.4
	(.67)			(6.70)			(3.77)		
Tenure (yrs)	.001	.000	0.0	-.026	-.006**	-1.6	-.009	-.001	-0.1
	(.22)			(4.85)			(1.46)		
Hours/week	.012**	.002**	1.0	.002	.000	0.0	-.001	-.000	-0.0
	(3.93)			(.57)			(.16)		
Union	.368**	.064**	30.5	.149	.035	9.4	.100	.016	2.0
	(3.82)			(1.59)			(.91)		
School (Primary)									
Secondary	.402*	.070*	3.3	.271*	.064*	17.3	.351*	.052**	6.5
	(2.51)			(1.96)			(2.48)		
College	.633**	.111**	52.8	.432**	.102**	27.6	.486**	.073***	9.1
	(3.92)			(3.05)			(3.13)		
University	1.00**	.193**	91.9	.540**	.129**	34.9	.668**	.093***	11.6
	(6.42)			(3.93)			(4.47)		

Note. N=5800. Absolute values of t-statistics are in parentheses. t-statistics for marginal effects are equivalent to those reported for coefficient estimates.
*Significant at 5 percent; **significant at 1 percent.

ENDNOTES

[1] Information on this project is available at www.wallnetwork.ca.

[2] Mean substitution was conducted on the small number of item non-response missing values (i.e., the largest percent of missing values on a given variable was 2.5).

[3] As noted earlier in the paper, this measure excludes respondents enrolled in diploma or degree programmes so as not to conflate Further Adult Education with Formal Schooling.

[4] Three-factor fit statistics: RMSEA = 0.006, 90% CI = 0.0– 0.02; $\chi^2 = 3.71$, p = 1.0; max absolute residual = .008
Two-factor fit statistics: RMSEA = 0.10, 90% CI = 0.09– 0.10; $\chi^2 = 437.77$, p<.01; max absolute residual = .111
One-factor fit statistics: RMSEA = 0.12, 90% CI = 0.11– 0.12; $\chi^2 = 1114.61$, p<.01; max absolute residual = .231