

# **Learning and Social Interaction in the Electronics Industry: Evidence from Canada and Mexico**

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# Outline

- Motivation & Background
- Research Questions
- Proposed Model
- Methodology
- Some Results
- Final Comments

# Motivation

- ✓ The nature of work today requires continuous learning from individuals in the workplace
- ✓ Exploring the extent to which social interactions had been able to promote and enhance participation in learning activities
- ✓ How participation in learning activities improves the overall well-being
- ✓ Collective learning is easier to develop between actors within a region than between actors in different regions [Lundvall and Borras 1998]
- ✓ Proximity matters
  - Geography
  - Cultural and social sense [Maskell and Malmberg 1999]

# Background

- Laiken, Edge, Friedman and West. 2001  
Case studies. Using organizational learning approaches to embed continuous learning within the work processes:  
Learning was found to be integrated into the change processes at the three levels – individual, group and systemic. Organizational support for learning is key in creating an environment for informal learning to prosper.
- Van del Sluis and Poell. 1998-99  
Longitudinal study (M.B.A. alumni – 96, 97, and 98):  
Impact of Learning Opportunities on Career Development.  
Career development depends on work environment (learning opportunities) and individual characteristics (learning behavior).

# Background

- Naquin and Holton. 2002  
Non-experimental cross-sectional study (in-house training programs, health insurance organization): Motivation for improving work through learning, based on expectancy theory – work commitment, interpersonal relations and achievement, learning engagement.
- Dahl and Pedersen. 2002  
Engineers in the telecom industry in Denmark:  
Informal contacts between employees is an important source of knowledge. Rumors about individuals or firms, future job openings and more – trading with expected reciprocity.

# Research Questions

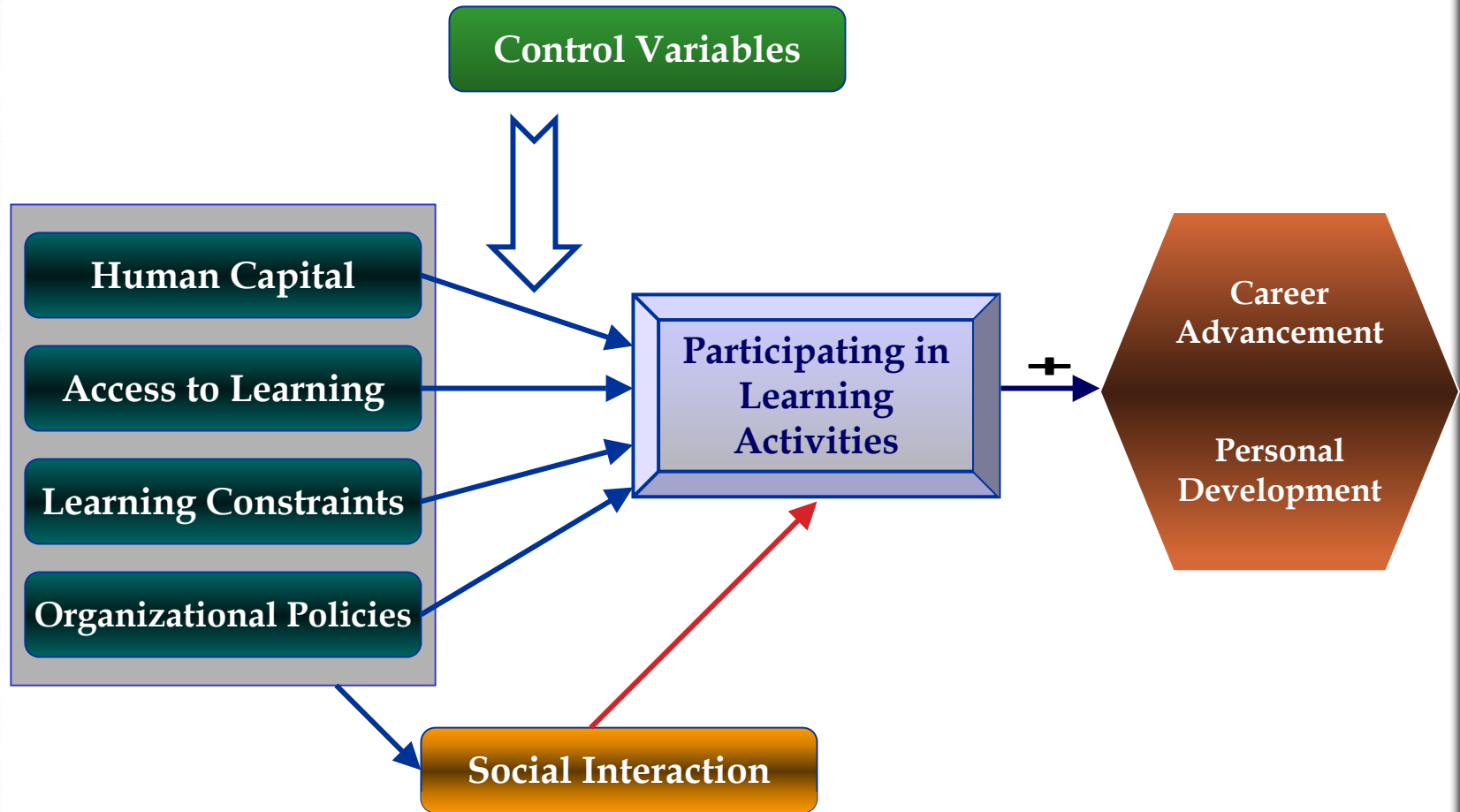
Q1a: How does individual commitment to learning influence participation in learning activities?

Q1b: How does the work environment influence participation in learning activities?

Q2a: Does participating in learning activities influence career advancement

Q2b: Does participating in learning activities influence personal development?

# Proposed Model ...



# Methodology

- Sample...
  - Non-random sample in the electronics sector (Mexico and Canada)
  - Multi-lingual Questionnaire
  - Web-based Survey on Learning Dynamics
  - “On-line” for 9 months (July 2002 – April 2003)
  - Size: N=784; Response Rate 35%
- Data analysis...
  - Multiple Regressions
  - Mediation/Moderation Effects



# Sample Profile:

<i>Variable:</i>	<i>Values</i>	<b>Total T=784</b>	<b>Canada C=276 (%)</b>	<b>Mexico M=508</b>
<b>Status</b>	Contract / Part-time	8.80	8.70	8.86
	Full-time	91.20	91.30	91.14
<b>Tenure</b>	Less than a year	11.73	7.97	13.73
	1 to 3 years	33.55	32.61	34.06
	3 to 6 years	31.38	22.46	36.22
	6 or more years	23.34	36.96	15.94
<b>Size</b>	Medium (less than 250 ee's)	19.26	21.02	18.31
	Large (250 ee's or more)	80.74	78.99	81.69
<b>Occupation</b>	Managerial	32.27	34.06	31.30
	Professional	53.57	50.36	55.31
	Technical	14.16	15.58	13.39
<b>Area of work</b>	Information Technology	14.41	23.19	9.65
	R&D	14.92	13.41	15.75
	Manufacturing Operations	38.52	34.42	40.75
	Staff Services	20.79	19.93	21.26
	Mkt / Customer Services	11.36	9.05	12.60

# Sample Profile:

<i>Variable:</i>	<i>Values</i>	<b>Total T=784</b>	<b>Canada C=276 (%)</b>	<b>Mexico M=508</b>
<b>Education</b>	HS or less	3.95	3.62	4.13
	College	10.46	10.51	10.43
	Undergraduate	63.14	53.26	68.50
	Graduate	22.45	32.61	16.93
<b>Age</b>	Under 25	9.69	2.90	13.38
	25 - 34	57.91	43.48	65.75
	35 - 44	19.01	23.55	16.54
	45 or older	13.39	30.07	4.33
<b>Gender</b>	Male	71.30	65.58	74.41
	Female	28.70	34.42	25.59
<b>Earnings</b>	Entry Level	20.54	11.23	25.59
	50,000 – 69,999	36.10	34.06	37.20
	70,000 – 99,999	21.94	34.78	14.96
	100,000 or more	21.42	19.93	22.24

# Participating in Informal Learning Activities

$$\text{InfL} = \beta_1 \text{Access} + \beta_2 \text{HumCap} - \beta_3 \text{Constraints} + \beta_4 \text{OrgPol} + \beta_5 \text{SocInter} + \beta_6 \text{Control} + \varepsilon$$

Access: access to informal learning(IL)

HumCap: level of education, years with the company

Constraints: lack of interest on IL, perception of time for IL, perception of need for more learning

OrgPol: support for learning, employee involvement, work arrangement

SocInter: frequency of social interaction with colleagues, customers, suppliers, universities, consultants, competitors; by face-to-face, telephone, electronic media

Control: individual characteristics, job characteristics, workplace characteristics

# Career and Personal Development

$$\text{CPro} = \beta_1 \text{InfL} + \beta_2 \text{JobCharacteristics} + \beta_3 \text{Age} + \beta_4 \text{Gender} + \beta_5 \text{Country} + \varepsilon$$

&

P (Prom) = probit Model including same indicators as in CPro

$$\text{PerDev} = \beta_1 \text{InfL} + \beta_2 \text{JobCharacteristics} + \beta_3 \text{Age} + \beta_4 \text{Gender} + \beta_5 \text{Country} + \varepsilon$$

# Descriptive Statistics and Correlations

## Correlations of Independent Variables with Dependent and Outcome Variables

Variables	Mean	S.D.	Min -- Max or Frequency of the potential values		Participation in Informal Learning	Number of Promotions	Perception of Career Progress	Personal Development
					Mean = 1.669 S.D. = 0.753	Mean = 1.011 S.D. = 0.935	Mean = 1.727 S.D. = 1.037	Mean = 3.772 S.D. = 0.877
<b>Level of Education</b>	<b>3.041</b>	<b>0.697</b>			<b>0.173 *</b>			
High School diploma or less			31					
College diploma/certificate			82					
Undergraduate/Bachelor Degree			495					
Graduate degree			176					
<b>Years with the company</b>	<b>1.761</b>	<b>1.130</b>					<b>- 0.118*</b>	
Less than 1 year			92					
1 to less than 3 years			263					
3 to less than 6 years			246					
6 or more years			183					
<b>Access to Informal Learning</b>	<b>4.993</b>	<b>2.084</b>	0	8	<b>0.538 *</b>	<b>0.206 *</b>	<b>0.317 *</b>	<b>0.315 *</b>
<b>Attitude towards Learning</b>	<b>4.271</b>	<b>0.539</b>	2	5	<b>0.234 *</b>	<b>0.077</b>	<b>0.076</b>	<b>0.073</b>
<b>Perception of time spent</b>	<b>2.486</b>	<b>0.560</b>			<b>0.253 *</b>	<b>0.077</b>	<b>0.154 *</b>	<b>0.294 *</b>
About right time spent on learning			406					
Too much time spent on learning			25					
Too little time spent on learning			353					
<b>Perception of need for more learning</b>	<b>4.277</b>	<b>0.715</b>	1	5	<b>0.167 *</b>		<b>0.154 *</b>	<b>0.265 *</b>
<b>Flextime</b>	<b>2.056</b>	<b>1.614</b>	0	4	<b>0.201 *</b>		<b>0.072</b>	
<b>Working from home</b>	<b>0.773</b>	<b>1.152</b>	0	4	<b>0.200 *</b>		<b>0.103 *</b>	<b>0.087</b>
<b>Organizational Support for Learning</b>	<b>3.674</b>	<b>0.758</b>	1	5	<b>0.329 *</b>	<b>0.131 *</b>	<b>0.299 *</b>	<b>0.466 *</b>
<b>Employee Involvement</b>	<b>2.716</b>	<b>1.164</b>	0	4	<b>0.264 *</b>	<b>0.227 *</b>	<b>0.229 *</b>	<b>0.234 *</b>
<b>Social Interaction</b>								
<b>Contacts: Face-to-Face</b>	<b>1.205</b>	<b>0.721</b>	0	4	<b>0.403 *</b>	<b>0.132 *</b>	<b>0.158 *</b>	<b>0.131 *</b>
<b>Contacts: Telephone</b>	<b>1.311</b>	<b>0.820</b>	0	4	<b>0.317 *</b>	<b>0.102 *</b>	<b>0.076</b>	
<b>Contacts: Electronic Media</b>	<b>1.324</b>	<b>0.859</b>	0	4	<b>0.339 *</b>	<b>0.103 *</b>	<b>0.104 *</b>	
<b>Attendance at conferences</b>	<b>0.758</b>	<b>0.583</b>			<b>0.347 *</b>	<b>0.122 *</b>	<b>0.180 *</b>	<b>0.197 *</b>
Never			251					
1 to 5 times per year			472					
6 or more times per year			61					
<b>Attendance at Prof. Assoc. Meetings</b>	<b>0.184</b>	<b>0.387</b>			<b>0.258 *</b>		<b>0.073</b>	<b>0.108 *</b>
Yes			144					
No			640					

\* Correlation coefficient is significant at the 0.01 level; otherwise, coefficient is shown at the 0.05 level.

# OLS Regression of Levels of Participation in Informal Learning Activities

		Levels of Participation in Informal Learning Activities					
		Model I Total, N = 784 Mean=1.669 SD=.753		Model II Canada, N = 276 Mean=1.881 SD=.637		Model III Mexico, N = 508 Mean=1.554 SD=.786	
Independent Variables	Indicators	t-values		t-values		t-values	
<b>Access to Learning</b>	Access	<b>0.102</b> ***	7.543	<b>0.086</b> ***	3.658	<b>0.095</b> ***	5.708
<b>Level of Education</b>	HumCap						
<i>(Undergraduate)</i>							
<b>High-school or less</b>		-0.124	-1.131	-0.047	-0.273	-0.149	-1.034
<b>College diploma</b>		<b>-0.131</b>	-1.808	-0.040	-0.374	-0.111	-1.143
<b>Graduate degree</b>		<b>0.143</b> **	2.65	0.078	1.106	<b>0.182</b> *	2.27
<b>Importance of Learning</b>	Constraints	<b>0.275</b> ***	6.634	<b>0.375</b> ***	6.453	<b>0.230</b> ***	3.946
<b>Perception of Time for Learning</b>	Constraints						
<i>(about right)</i>							
<b>Too much time</b>		-0.021	-0.179	<b>0.396</b> *	2.064	-0.092	-0.607
<b>Too little time</b>		<b>-0.174</b> ***	-3.886	-0.091	-1.320	<b>-0.165</b> **	-2.751
<b>Support for Learning</b>	OrgPol	0.021	0.611	0.082	1.404	-0.005	-0.123
<b>Flextime</b>	OrgPol	<b>0.028</b>	1.914	0.006	0.276	<b>0.032</b>	1.652
<b>Working from Home</b>	OrgPol	0.003	0.156	0.034	1.191	0.002	0.084
<b>Employee Involvement</b>	OrgPol	0.027	1.336	<b>0.055</b>	1.796	0.001	0.040
<b>Contacts: Face-to-Face</b>	SocInter	<b>0.139</b> **	2.911	<b>0.160</b> *	2.071	<b>0.179</b> **	2.827
<b>Contacts: Telephone</b>	SocInter	-0.043	-0.808	0.015	0.153	-0.084	-1.236
<b>Contacts: Electronic Media</b>	SocInter	<b>0.122</b> **	2.851	0.031	0.356	<b>0.144</b> **	2.811
<b>Attendance at Conferences</b>	SocInter	<b>0.155</b> ***	3.815	0.061	0.916	<b>0.208</b> ***	4.031
<b>Attendance at Prof Asoc Meetings</b>	SocInter	0.095	1.612	0.054	0.707	<b>0.161</b>	1.825
<b>Economic Downturn Effect</b>	Control	<b>0.063</b> *	2.476	0.010	0.271	<b>0.102</b> **	2.983
<b>Female</b>	Control	<b>-0.147</b> **	-3.043	<b>-0.117</b>	-1.740	<b>-0.189</b> **	-2.813
<b>Income Level</b>	Control						
<i>(Entry level)</i>							
<b>Level 2</b>		0.088	1.495	<b>0.303</b> **	2.742	-0.010	-0.14
<b>Level 3</b>		-0.043	-0.613	0.115	0.942	-0.081	-0.864
<b>Level 4</b>		<b>-0.172</b> *	-2.315	-0.077	-0.562	<b>-0.229</b> *	-2.426
<b>CANADA</b>		<b>0.211</b> ***	3.643				
	Adj R <sup>2</sup>	0.455		0.442		0.443	
	F-value	18.65		7.06		12.19	
	Sign. F	0.000		0.000		0.000	

Controlling for age, occupation, area of work, job characteristics, employment status, years with the company

Reference categories in italics.

\* p<0.05; \*\*p<0.01; \*\*\* p<0.001

# OLS Regression of Career Advancement and Personal Development

	Career Advancement				Personal Development	
	Model I (Career Progress) Mean=1.727 SD=1.037 Min=-1 Max=3		Model II (#Promotions) Mean=0.654 SD=0.476 Yes=513 No=271		PerDev Mean=3.773 SD=0.877 Min=1 Max=5	
Independent Variables	t-values		dF/dx	z-values		t-values
Participating in Informal Learning	<b>0.239</b> ***	4.844	<b>0.060</b> **	2.470	<b>0.120</b> **	3.068
Job Characteristics	<b>0.406</b> ***	7.654	<b>0.066</b> **	2.570	<b>0.587</b> ***	14.001
Age ( <i>25 to 34 years old</i> )						
Under 25	0.087	0.714	-0.022	-0.360	0.036	0.376
35 to 44 years old	<b>-0.285</b> **	-3.041	-0.068	-1.460	0.099	-1.338
45 years and older	<b>-0.437</b> ***	-3.738	<b>-0.235</b> ***	-3.960	0.501	-0.543
Female	<b>0.150</b>	1.900	0.054	1.390	0.096	1.535
CANADA	0.118	1.431	-0.011	-0.280	0.070	-1.069
	Adj R <sup>2</sup>	0.121	Pseudo-R <sup>2</sup>	0.031	Adj R <sup>2</sup>	0.233
	F-value	16.38	X <sup>2</sup> -value	30.96	F-value	34.93
	SignF	0.000	SignX <sup>2</sup>	0.000	SignF	0.000

\* p<0.05; \*\* p<0.01; \*\*\* p<0.001

Reference categories in italics

# Final Comments...

- ❑ Move beyond the notion of training to Learning
- ❑ Learning needs:
  - ✓ Specific Knowledge (Er)
  - ✓ Self/internal Knowledge (Ee)
  - ✓ Access to Social Capital
- ❑ Career Advancement: higher perceived progress among younger knowledge workers
- ❑ Personal Development: people want challengeable jobs