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Human Capital Versus Market Signaling Theory: The Case with Adult Literacy

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Abstract. Human capital and market signaling theory are compared using data from the Statistics Canada Survey of Literacy Skills Used in Daily Activities (1990). The results indicate that both theories explain variations in annual income and number of weeks worked. Employers use education credentials (market signaling theory) to select employees who are then rewarded with earnings based on their literacy levels (human capital theory). Implications of these findings for policy and practice are presented.

This study compares two classic theoretical explanations which have been advanced to account for the relationships among education, labour market participation and earnings. Unlike other empirical tests of the theories however, in this study they are compared within the narrowly defined context of functional literacy skills and the broadly conceived construct of education credential level.

Human capital theory (Schultz, 1960; Becker 1964; Hanoch, 1967) posits that investments in education (literacy in this case) result in higher labour market participation, productivity and market earnings. Persons with similar levels of education achieve similar levels of labour market participation, productivity and earnings, on average, as other persons with similar socio-demographic and labour market characteristics. The alternative theory, market signaling, (Arrow, 1973; Spence, 1974; Stiglitz, 1975) claims that while education (literacy in this case) results in higher productivity, employers use education credentials to infer, that is to recognize as a signal, that an employee, or prospective employee, has the potential to achieve high levels of productivity, to be trainable without incurring unnecessary costs and therefore, to merit higher earnings. Persons with knowledge and skills (literacy in this case) who lack educational credentials cannot signal their potential to an employer, therefore they do not get hired, or if hired they do not get promoted, do not have access to training and consequently do not achieve the benefits that their education (literacy skills) merits.

Human capital theory suggests that literacy programs, whether community or work-place based, which focus on improving levels of literacy, but do not offer a recognized and transferable credential, will allow participants to achieve higher labour market participation, productivity and earnings. Signaling theory, on the other hand, suggests that greater access to the labour market and gains in earnings will occur only when higher levels of literacy are also accompanied by the acquisition of a recognized and transferable education credential.

Method

Data from the 1989 Survey of Literacy Skills Used in Daily Activities (Statistics Canada, 1990) was used to test the two competing theories. The effects of functional literacy level and education credentials on number of weeks worked and annual income are compared using a weighted national labour force sample of persons aged 16 to 69 (Statistics Canada, 1990). The test of human resource development versus signaling theory in this initial exploratory study of the question is elegantly simple, expressed as a two way factorial analysis of covariance (SPSS, 1990). If persons in the labour market, both the employed and unemployed, are subjected by employers to educational

credential scrutiny they can be differentiated into groups and the interactions between literacy levels and credentials can be depicted by sign patterns as indicated below:

Table 1: Predicted Sign Patterns of Relationships Among Literacy, Education and Income/Labour Market Activity.

		Education Credentials		
		No High School Credential	High School & No Post Sec. Credential	Post Sec. Credential
Functional Literacy Levels	Low	---	--(-1/2) (+1/2)	--+
	Moderate	--+	-(-1/2) (+1/2)+	-++
	High	-++	(-1/2) (+1/2)++	+++

The main effects of literacy are the effects of the literacy categories averaged across the credential categories and similarly the effects of credentials are averaged across the literacy categories. If employers rely on credentials to make decisions regarding hiring, promotion, training and salary we can expect those decisions to be reflected in higher levels of employment duration and earnings for those with credentials. If employers do not respond to credentials, as signals of employee potential, the effect of literacy will be constant across credential levels. It was expected that there would be no interaction between literacy level and education credential when both categories were either high (+++) or low (---).

Literacy scores were grouped using the five categories of functional literacy behavior established by Statistics Canada . Education credential level, a five category variable, was created from responses to the survey question "What is the highest level of schooling you have completed?" Two of the five categories included persons who lacked formal education credentials important in the labour market. Category one included respondents who did not have a high school completion certificate or diploma and category three included respondents who had completed high school and taken some further education or training but lacked a post-secondary certificate or diploma. The categories which included respondents with credentials were: category two, persons with a high school completion certificate; category four, respondents with a post-secondary community college or technical institute certificate or diploma; and category five, university baccalaureates and above. The effects of gender, age, nativity, industry and occupation, known from previous studies of this data set to impact on labour market participation (Blunt 1991a & 1991b), were controlled by entering them as covariates. Two analyses were conducted, the first with household income as the dependent variable and the second with total number of weeks worked in the preceding year, as the dependent variable.

Results

As anticipated from previous studies (Blunt, 1991a & 1991b) both literacy and education levels were associated with income. Also each of the covariates demonstrated significant effects on the two dependent variables (See Table 2).

Table 2: ANACOVA Summary Table - Income by Literacy level, Education Level, Sex, Age, Nativity, Occupation and Industry.

Source of Variation	Sum of Squares	d.f.	Mean Square	F	Sig.
Main Effects	1959441	8	244930	120	<.001

Education Level	1635708	4	408927	85	<.001
Literacy Level	323732	4	80933	42	<.001
Interaction (Ed x Lit)	218409	15	14560	25	<.001
Covariants					
Sex	4058946	1	4058946	562	<.001
Age	3213437	1	3213437	339	<.001
Nativity	16616	1	16616	10	<.001
Occupation	1693545	1	1693545	28	<.001
Industry	61	1	61	27	<.001

Unexpected variations in the dependent variable means, were observed in those cells where low numbers of respondents were encountered. (See for example, Literacy level one and Education level one in Table 3 and Table 4). It appears likely that some estimates of the dependent variable in certain categories are biased by the small sample size.

The analysis revealed that persons holding the same levels of literacy, after controlling for the effects of sex, age, nativity, occupation and industry, are rewarded with higher incomes as their level of education increases. For example persons functioning at literacy level two who did not complete high school had an average income of \$12,100 pa increasing to \$35,000 pa for those with a university degree (See Table 3). Similarly, persons with the highest literacy level, level five, had an average income of only \$15,150 pa if they did not complete high school and an average income of \$15,900 pa if they did. Incomes for this group increased to \$24,450 pa if they had a post-secondary credential and to \$36,000 pa if they had a degree or higher credential.

It was also observed that within each level of education higher levels of literacy were associated with higher incomes. For example, average incomes for those persons who did not complete high school (Education level 1) increased from \$12,100 pa at Literacy level 2, to \$15,150 pa if they scored at level 5 on the functional literacy test (See Table 3). For those who had earned a post-secondary credential (Education level 4) their average income increased from \$14,300 pa if they were functioning at literacy level two, to \$24,450 pa at literacy level five. These findings demonstrate that education levels mask a wide range of literacy skills. Consequently, employers' reliance on education credentials in the hiring process frequently results in unsatisfactory decisions.

Table 3: Mean Personal Annual Income by Education and Literacy Level

Literacy Level	Education Level					Total
	1	2	3	4	5	
1(2)	13,800	34,500	14,300	15,000	23,550	16,650
2	12,100	14,450	14,200	14,300	35,000	13,200
3	13,500	14,700	15,750	17,550	35,800	14,700
4	13,050	15,000	16,200	25,350	33,500	17,550
5	15,150	15,900	14,300	24,450	36,000	19,350
Total	13,250	15,300	15,150	24,450	34,500	16,500

Similar effects of literacy and education level on number of weeks worked were observed in the second analysis with the dependent variable of number of weeks worked. Persons who had not completed high school (Education level 1) worked an average of only 41.98 weeks pa increasing progressively to 47.45 weeks for those persons with university degrees (Education level 5) (See Table 4). Those with the lowest levels of literacy worked the fewest number of weeks per year. Persons with level two literacy for example, worked an average of only 43.32 weeks while those with level five literacy worked 45.95 weeks per year.

Table 4: Mean Number of Weeks Worked In Preceding Year by Education and Literacy Level

Literacy Level	Education Level					Total
	1	2	3	4	5	
1(3)	44.20	43.90	32.72	52.00	22.86	43.86
2	39.91	45.27	45.21	48.42	52.00	43.32
3	41.02	44.82	45.00	45.01	51.70	43.34
4	42.36	44.42	44.24	47.15	47.24	44.50
5	47.50	45.00	45.88	45.28	46.38	45.95
Total	41.98	44.61	44.74	46.55	47.45	44.25

Similar patterns were observed for persons with level two literacy who worked an average of 43.32 weeks increasing to 45.95 weeks for those with level five literacy. A comparison of those who did not complete high school (Education level 1) with those who held a high school diploma (level 2) demonstrates that those persons who lack the credential, yet who have the same level of literacy, work fewer weeks per year. Persons with level two literacy, for example, who lack the credential work on average only 39.91 weeks, as compared to 45.27 weeks for those with the same level of literacy who hold the credential. At level four the difference is between 42.36 weeks worked for those who did not complete high school as compared to 44.42 weeks for those who hold a completion certificate or diploma.

Discussion

The analysis sought to answer the question, "Do employers reward literacy (through hiring, promotion and salary decisions) only when literacy is accompanied with an educational credential? The answer appears to be a qualified "No". Human resource development theory provides an explanation for variations in employees' incomes and the claims of employers that they do reward higher levels of literacy in the work place is given credence by the study findings. However, the data also clearly indicates that employers use education credentials to select and promote employees, thus evidence of the use of market signaling theory is also confirmed.

Adult basic education's (ABE) major target population, the marginalized, who are frequently non-credentialed and unemployed, are highly disadvantaged by employers' use of education credentials (market signaling) when making hiring decisions. A major implication of this study for adult education policy and practice is therefore, that for adult basic education, and workplace literacy education programs, to serve as an effective instrument to reduce income inequalities in society, ABE program outcomes need to do more than provide learners with related literacy skills. Rather, they need to provide a transferable credential which will enhance the hiring prospects of unemployed learners and the future prospects of employed learners should the latter leave, or lose, their current jobs.

It is an ethical requirement for adult educators to determine whose interests are being served by the programs they deliver. To what extent are workplace programs enabling employed learners to perform work more efficiently for their current employers while failing to provide an important collateral benefit to the employees? Are literacy programs which do not offer recognized credentials, yet which use public funds, better serving the interests of employers and adult education providers than the interests of their participants? Regardless of who bears the costs of workplace literacy education, employers, employees, government or a combination of each vested interest group, the long term interests of each party are best served by the awarding of earned, publicly recognized credit and marketable credentials. Organized labour, working with employers to provide workplace education programs needs to consider the role of education credentials in hiring and promotion decisions and to negotiate with ABE providers and employers for the awarding of credentials and the "laddering" of programs to derive the greatest benefits from participation for their members. Colleges and other providers of contracted workplace and community based ABE programs need to consider innovative means of serving the labour markets' learning and credentialing needs.

What is needed, particularly by those adults whose levels of literacy exceed their education credentials (years of schooling) is a challenge, or testing program and assistance in the development of a publicly certified resume which can "signal" their employment potential and capabilities to prospective employers. The means of awarding recognized and transferable credit or credentials might include, for example, the increased use of prior learning assessment (PLA) or challenging GED examinations or local high school or post secondary program outcomes. Public education agencies need to recognize that for many adults additional levels of literacy will not be sufficient to assist them to gain and retain employment. One additional benefit from providing workers with accurate statements of their knowledge and skills may be to halt the increasing practice of credential inflation, another hiring practice which disadvantages those who hold the lowest credentials and which contributes to the underemployment of many others.

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