A STUDY IN COOPERATIVE EDUCATION

by

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Often the sole reason behind enrolment in post secondary education is the pursuit of stable well-paying employment. Enrollment is also done without the knowledge of how post secondary education will be applied in the workforce. This paper sets out to test the effectiveness of cooperative education on employment rates two years and five years after graduation. To contrast the exploitation of cooperative education, this paper also looks at how the addition of education certification affects employment rates two years and five years after graduation. With respect to employment rates, cooperative education did play a large significant role while the addition of education certification played a much smaller one. The affects vary by program.

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Introduction

It is common for students to pursue post-secondary education with few ideas regarding how their education will facilitate their employment opportunities. In fact, attendance in postsecondary education has become a dominant trend in Canadian society. Due to the sheer number of students graduating from postsecondary education, the availability of employment opportunities for new graduates are becoming increasingly limited and there is no longer a guarantee of well-paying employment[1]. We are now in a conundrum to produce an efficient entry into the labour force, as Boudarbat and Chernoff document that approximately one of three students do not find work in their related field of study[2].

Because of the great increase in students graduating from post-secondary institutions who require stable and well-paying employment, we are now at a stage in knowledge-based economies that requires a close relationship between the education system and the labour force. The next level of productivity gains may be established by efficiently tying the labour force to the education system to allow for a smooth transition for new post-secondary graduates into the workforce. This can be accomplished though employing different policies that would join these two entities in order to ensure that post-secondary graduates can access decent employment and actually maximize their educational training in the workforce. While many students choose post-secondary

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[1] Walters, D. and Zarifah, D. (2008) 'Earnings and employment outcomes for male and female postsecondary graduates of coop and non-coop programmes' *Journal of Vocational Education and Training* ,60 (4).
[2] Boudarbat, B. and Chernoff, B. (2010) 'The Determinants of Education- Job Match among Canadian University Graduates' Working Paper.

education to find well-paying and stable employment after graduation, some choose to pursue post-secondary education out of interest or to build their knowledge. Regardless of the reasons students pursue post-secondary education, there is still the very real issue many post-graduates face, and that is difficulty finding well paying, stable employment. This paper proposes a policy path that can produce an education labour force connection through the cooperative education link. As a result, employment opportunities should increase if employers are able to better access a labour force directly from post-secondary institutions.

While studying, students gain analytical skills and learn to actively problem solve. Adding a cooperative component to the education system will offer students practical work experience where they can apply their analytical skills as well as the practical skills gained through cooperative education. Work skills are acquired during employment and employers can observe education training in the practical field to analyze employee specific productivity[3]. Employers seek workers with in depth knowledge specific to an employer's industry; educational institutions can provide these employers with students whose field of study pertains to these particular industries. US researchers argue that coop (short for cooperative education) graduates provide employers a mode of differentiating employees[4]; by this, they are able to rank employees based on job skills and use this information to determine wages.

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[3] Walters, D. and Zarifah, D. (2008) 'Earnings and employment outcomes for male and female postsecondary graduates of coop and non-coop programmes' *Journal of Vocational Education and Training* ,60 (4).
[4] Ibid

Another important efficiency of coop policy implementation in relation to the labour force is the reduction of education-job mismatch. Students attend an educational institution for years, and a high percentage of these students do not secure employment in their fields of study[5]. This causes, at least, a partial loss in the skills and knowledge acquired during education training, resulting in a wage loss, higher turnover rates, and increased training costs[6]. The wage loss stems from the fact that an employer would have to provide on-site training to an employee who might otherwise not require this training if they had knowledge of the field through formal education. Such circumstances cause lower productivity until the worker is properly trained. This might also cause higher turnover because graduates do not find jobs in their field, and as a result, are dissatisfied working in fields with which they are unfamiliar[7]. Intuitively, if one studies a subject for years, they should have some interest in it. A way to enhance social welfare is to match graduates of postsecondary institutions with their subsequent employment[8]. An efficient education system that caters to the education-job match would do just that, matching graduates of postsecondary institutions with their employers, thus, leading to productivity and social benefits such that welfare increases[9].

Stern et. al. note that coop placements create closer connections between students and employers, bringing school and work together[10], and this serves to increase social

[5] Boudarbat, B. and Chernoff, B. (2010) 'The Determinants of Education- Job Match among Canadian University Graduates' Working Paper.

[6] Ibid

[7] Ibid

[8] Ibid

[9] Ibid

[10] Stern, D., Finkelstein, N., Urquiola, M., and Cagampang, H. (1997) 'What Difference Does It Make If School and Work are Connected? Evidence on Co-operative Education in the United States' *Economics of Education Review* , 16 (3).

networks and relationships[11]. Employers can rely on schools to provide them with a continual flow of labour, which costs less than directly recruiting employees on the open market. This also has social benefits because of the possible increase to productivity. Students who also feel it is important to use their knowledge and skills on the job have a higher degree of job satisfaction[12].

Many students would agree that they attain post-secondary education to obtain stable well-paying employment. It is only logical for the education system to provide these students with on the job training. It is also logical to believe that the technical training students obtain through coop provides them with an experience that will last for the lifetime of their career. They gain employment experience, professionalism, knowledge of an industry and team constructiveness, all which are valuable across different employment settings.

Cooperative education converts students' part-time jobs into educational experiences that actually enhance academic achievement[13]. Student academic achievement on tests has also been shown to be enhanced by coop placements[14]. In general, Doray et. al. find that, graphically, grades and the amount of time spent working

[11] Walters, D. and Zarifah, D. (2008) 'Earnings and employment outcomes for male and female postsecondary graduates of coop and non-coop programmes' *Journal of Vocational Education and Training* ,60 (4).

[12] Boudarbat, B. and Chernoff, B. (2010) 'The Determinants of Education- Job Match among Canadian University Graduates' Working Paper.

[13] Stern, D., Finkelstein, N., Urquiola, M., and Cagampang, H. (1997) 'What Difference Does It Make If School and Work are Connected? Evidence on Co-operative Education in the United States' *Economics of Education Review* , 16 (3).

[14] Stern, D., Finkelstein, N., Urquiola, M., and Cagampang, H. (1997) 'What Difference Does It Make If School and Work are Connected? Evidence on Co-operative Education in the United States' *Economics of Education Review* , 16 (3).

have an inverted U shaped relationship[15]. That is to say, grades get better with hours worked, but only to a certain point. A possible reason for this could be that students are given a break from the stress of post-secondary education, but it could also result from their ability to manage their time more efficiently. Coop students, similarly, demonstrate a small increase in grades when they work twenty hours a week[16]. Blair, Millea and Hammer, for example, found that coop engineers on average had a GPA that was six percent higher than that of non-coop engineers.[17]

Although the employment of coop graduates varies by program and institution type, it has been found that university coop graduates of technical fields were twelve percent more likely to have full time jobs than those without coop experience[18], and graduates from occupation specific programs have a higher degree of job education match[19]. For college graduates there is about an eight percent difference in the employment rate between coop and non-coop, while in universities there is about a fifteen percent difference. Coop university graduates are also less likely to be overqualified than graduates of conventional programs[20].

[15] Moulin, S., Doray, P., Laplante, B., and Constanza M. (2013). 'Work intensity and non- completion of university: longitudinal approach and causal inference' *Journal of Education and Work* , **26** (3).

[16] Stern, D., Finkelstein, N., Urquiola, M., and Cagampang, H. (1997) 'What Difference Does It Make If School and Work are Connected? Evidence on Co-operative Education in the United States' *Economics of Education Review* , 16 (3).

[17] Blair, B., Millea, M., and Hammer, J. (2004) 'The Impact of Cooperative Education on Academic Performance and Compensation of Engineering Majors' *Journal of Engineering Education* ,93 (4).

[18] Walters, D. and Zarifah, D. (2008) 'Earnings and employment outcomes for male and female postsecondary graduates of coop and non-coop programmes' *Journal of Vocational Education and Training* ,60 (4).

[19] Boudarbat, B. and Chernoff, B. (2010) 'The Determinants of Education- Job Match among Canadian University Graduates' Working Paper.

[20] Walters, D. and Zarifah, D. (2008) 'Earnings and employment outcomes for male and

In the past twenty years, the number of coop programs available in Canadian institutions has taken a large step. Government and the private sector have rapidly expanded coop opportunities to improve the school to work transition experience. Currently, five percent of all university graduates have completed a coop program where eighty-five percent were concentered in technical programs[21]. From the 95 National Graduate Survey, Figure 1 offers insight regarding student cooperative education enrollment. It can be noted that most programs that do offer coop have a very small student uptake. Furthermore, the highest levels of coop occur in Engineering and technologies where fewer than twenty percent of students who graduate have taken a coop program, however, there is still a lot of room for coop programs to expand in the future.

Of course, when considering the employment rate across programs without considering coop, there is a significant difference between programs. Arts and Humanity programs have a far lower employment success rate than other programs such as Engineering and Sciences because Arts and Humanity programs, in general, are more impractical. Students in Arts and Humanity programs are perhaps more likely to pursue post-secondary education out of interest or to gain knowledge rather than for the purpose of obtaining an occupation after completing post-secondary education.   What if, however, the Arts and Humanities did introduce more programs that included coop, such

female postsecondary graduates of coop and non-coop programmes' *Journal of Vocational Education and Training* ,60 (4).

[21] Walters, D. and Zarifah, D. (2008) 'Earnings and employment outcomes for male and female postsecondary graduates of coop and non-coop programmes' *Journal of Vocational Education and Training* ,60 (4).

as placements as editors, researchers, underwriters, policy makers etc.? Perhaps there may be a higher employment rate for these graduates too.

This paper adds to the recognition of cooperative education and its benefits; specifically in regards to benefits in relation to program studied. It is not obvious that some programs of study are strictly theoretical or offer a category of learning that would have barriers to entering the workforce because of unmarketable skills. For example, programs such as Mathematics or Fine Arts have large gaps between theoretical and practical learning and as a result, these may be programs where cooperative education would have a much larger employment impact. This study attempts to illustrate which programs have the highest employment rates, and which programs have the highest employment rates when cooperative education is offered.

This paper also recognizes the benefits of diversifying one's education. The term diversification is used to describe multiple certifications or levels of education added to the initial program completed. To contrast the idea of diversification, it can be considered that the uptake of cooperative education in a field of study allows students to further understand their field by acquiring work experience in their industry. In a way it can be seen as specializing, in that, students are given a specific skill set in their program of study and offered the opportunity to further define that skill set though employment in their field.

Since the inception of the Information Age, many are looking to continue to keep pace with the fast moving technological environment. To do this, they choose to add program certifications to their graduated program. In the modern and advanced economy, the rate of technology progresses quite rapidly, and employees with seniority

are therefore likely to have less of an education-job match compared to workers who received a more recent education[22]. Does this make those who added program certifications more employable?

Due to the speed of technological change, it is possible that a set of skills refined by the cooperative education policy could become obsolete over an individual's working career. A research test can then be implemented to decide how well an individual's knowledge can conform to job specifications by looking at their ability to earn multiple certifications through their education. The strategy of education can then be considered, whether it is specialized using policies such as cooperative education, or if it is diversified through multiple program certifications, in order to uncover which strategy would yield a higher level of employability. By juxtaposing the policy of cooperative education with a strategy of diversification, this paper sets out to define which education structure better suites student employability three years after graduation and five years after graduation.

This paper also examines how the status of employment changes five years after graduation. Increasingly, contract work has taken people out of fulltime jobs with a single employer, and forced them to take up multiple jobs and with various employers to maintain adequate employment. Contract work allows employers to take advantage of labour throughout the business cycle. It is reasonable to assume that if an employer thinks an employee is valuable enough, they would not want to lose them to another business as a result of business cycle fluctuations. In order to explore how cooperative education creates employment fit for new graduates so that they are able to remain

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[22] Boudarbat, B. and Chernoff, B. (2010) 'The Determinants of Education- Job Match among Canadian University Graduates' Working Paper.

employed over a period of time consisting of three years with the same employer, this paper examines employment trends for post-secondary graduates between the years 1997 and 2000.

Institutional Details

The institution of cooperative education can be described as a method to integrate classroom theory with technical work experience. Students are given credit towards their program credentials by completing a specified number of hours of on the field training alongside the fundamental knowledge they gain from traditional in-class schooling.

Models of cooperative education vary depending on the educational institution. In the most common model, semesters alternate between on the job technical training and in class theoretical development. The semesters usually alternate after the first year of program enrollment and continue until graduation. Students typically graduate in the four-year program duration while few take an extra semester.

Cooperative education structures are increasingly understood as a way to facilitate students' school to work transition. Students are provided job experience that allows them to earn a fulltime job at their placement or use this experience when applying for another job. For most students, finding the initial experience is crucial when entering the workforce.

Cooperative education differs from a system where students find a placement in the final year of graduation because they have the opportunity to work for several companies to gain an understanding of the industry. A student can also work for the

same employer and obtain different titles within that company or institution to obtain a stronger sense of the business. Cooperative education allows students to learn about the industry before they begin their careers, while current industry practices do not allow the student to have the same time to reflect over the business or the industry.

Model

The analysis of cooperative education as it relates to employment begins with defining employment as a function of other factors that influence it. Employment is understood as being a function of the following factors: an individual's ability, the surrounding socio-economic environment, the individual's education, past work experience and social network. This paper develops a framework for employment using these factors that influence employment. For reason pertaining to modeling actual data, this study does not include the later inputs. Social network is incredibly difficult to find data for, and because we are dealing with a sample of new graduates the handful that do have this advantage in the field are considered outliers. Thus, this report assumes that students may employment experience if they are in a coop program and that social networks do not contribute to employment. The remaining factors namely an individual's ability, the surrounding socio-economic environment and the individual's education serve as the basis for the employment framework. This paper then incorporates variables for cooperative education as well as adding an education certification to one's program into the employment framework in order to discover value in the likelihood of employment success.

(I) Individual's Ability

First, consider the individual's ability. Using variables from the National Graduate Survey, a list determining this factor can be devised: "ability to write clearly and concisely", "ability taken from education or training", "ability to think critically", "ability to solve problems effectively", "ability to learn and use new technology", and finally "did the individual have a job that lasted six months or more?" The majority of these variables relate specifically to the individual's ability. For example, the variable "ability from education or training" is a variable specifically related to how one's ability is impacted by their educational program knowledge. The last variable in the list, "did the individual have a job that lasted six months or more?" was included in the individual's ability because it illustrates whether or not the individual has ambition in their work-life, and whether or not the individual demonstrates employable characteristics that can be utilized over time.

(II) Socio-economic Factors

Second, factors contributing to the individual's socio-economic environment are added to the employment framework to account for changes that arise based on the interplay of the individual's interactions with their environment that may affect their employability. A list of socio-economic variables can be developed from the National Graduate Survey beginning with "current status in Canada." This variable serves to embrace the employment function for factors that affect employment given a person's nationality. Past research has noted that nationality affects the prospects of employment. Specifically, those with non-white backgrounds have a lower probability of employment with all else being constant. Although this variable cannot describe second-generation

nationalities or specific race characteristics it is important to include the Canadian

nationality variable since it describes how an individual's nationality may hinder

employment success. Next, a key variable affecting employment is whether or not a

member of the sample has dependent children. The variable "have dependent children" is

added to the group of socio-economic factors contributing to employment as this variable

may hinder work life or the ability to stay employed, as children occupy a person's time

and alter their life style. A person's initial economic status may be a reason for them to

find employment and stay employed; the variable "applied for a loan to fund education"

is a way to account for an individual's economic circumstances. An individual who

applies for a student loan may have the subjective personal view that they do not have

enough personal wealth to obtain the requisites for a particular year in their educational

program. This personal subjective nature may also be the reason why an individual

would obtain a job immediately after completing school. It is logical to believe that if

one does not feel their wealth is adequate, they will look for ways to enhance it,

particularly though employment. A more concrete way to describe the subjective nature

of a student loan classifying economic circumstances is to consider that student loans are

generally given to students who do not meet a particular threshold of wealth. Now, after

graduation they are required to pay these loans back. This requirement is a burden that is

only alleviated through the pursuit of employment. Thus, "applied for a loan to fund

education" is used as a proxy for wealth in contributing to the socio-economic factors

describing the employment framework. A pair of variables that describe the individual's

household that could affect their employment status are: "father's education level" and

"mother's education level." These variables can both contribute to employment because

the individual may have a specific attitude towards life as a result of their upbringing. Specifically, if your parents are university graduates you are more likely to graduate from university. Perhaps it is because if your parents went to university, they can probably help you financially to get to university or because if you're a person whose parents have never pursued post-secondary education you might feel like post-secondary education is unattainable because no one in your family has ever made it into those institutions. Either way upbringing may result in traits that employers' desire, making it easier for the individual to find work. The province where schooling occurred is another variable present in the set of socio-economic variables that contributes to the employment framework to ensure that employment opportunities that vary across provinces are accounted for. For example, a new graduate is likely to look for employment in the same region they graduated. If their school was in Ontario they would have more opportunities for employment there because there is a diverse field of employment compared to the Atlantic Provinces where a much lower range of diversified employment trends are recognized. Finally, we include "gender of respondent" as a key socio-economic trait affecting employment to control for circumstances when gender affects employment and the employment framework.

(III) Education

Thirdly, education training plays a key role in determining employment. Education training allows individuals to gain specific knowledge and then apply that knowledge in both theoretical and technical ways. This report does not take into account inconsistencies contributing to employment across educational institutions. Educational institution branding variables were simply not available. Alongside of institution

recognition, "type of school" was also a variable that could not be specified in this report. There was simply not enough information to document whether the institution was a community college or university. Instead, the educational factor that would contribute to the employment framework includes "program studied". Using this variable we can account for differences among programs that contribute to employment. An employer is usually interested in what types of credentials an individual has when applying. For this reason, education by program is added to the employment function.

This paper is mainly interested in how cooperative education affects employment prospects. For this reason, it is also included in the employment framework. In conjunction with coop, this paper also discusses how adding additional education to one's program of study after graduation would affect employment prospects. It can be theorized that one would remain employed if they move up in the ranks of a company, and they certainly would not be unemployed if they found another job while employed at an initial occupation. It is then logical to believe that if one were to upgrade their skills while employed then they would remain employed over time. For this reason, the variable "adding education" is a factor in the employment framework.

(IV) The Logit Model

It is now relevant to discuss how the employment framework will translate into the employment model. Individual i has two different skill levels, e_{i1} or e_{i0}. These levels are associated with $y_i=1$ or $y_i=0$ respectively. The individual then selects skills that would yield the greater level of employment.

$$y_i = \begin{cases} 1 & if\ e_{i1} > e_{i0} \\ 0 & otherwise \end{cases}$$

The employment variable, e_i, is unknown to the researcher, who only observes the components that make up the employment framework. Specifically, the researcher observes:

$$f(c_{ij},\ ad_{ij},\ in_{ij},\ s_{ij},\ ed_{ij},\ \theta_{ij})\ \text{for j=0,1}$$

From the employment framework we then have:

$$e_{ij} = \alpha_j c_i + \beta_j p\_ad_i + \gamma_j in_i + \delta_j s_i + \varepsilon_j ed_i + \theta_{ij}\ \text{for j=0,1}$$

Notes: The subscript i denotes any individual in the population. The subscript j denotes the employment level. Employment status is abbreviated with the letter e; cooperative education status is denoted by c, a binary variable. Certification addition after the completion of the program graduated in 95 is denoted with p_ad. This is a binary variable. The abbreviation in stands for an individual's education characteristics as described in Table 2. Table 1 lists socioeconomic traits, which are included in the abbreviation s. Education factors are included in the model denoted by ed. The error of estimation is denoted by θ.

θ_{ij} captures unobserved factors that affect employment not included in the employment framework. This theoretical setup will be used to make probabilistic statements about the observed employment level e_i conditionally on the employment framework.

To develop a model for the observed employment levels, the conditional probability of observing $y_i=1$ can be expressed as a probability between the two employment levels:

$$\Pr(y_i=1 \mid c_i,\ ad_i,\ in_i,\ s_i,\ ed_i,\ \theta_i,\ \alpha_1, \alpha_0, \beta_1, \beta_0,\ \gamma_1, \gamma_0, \delta_1, \delta_0,\ \varepsilon_1, \varepsilon_0) = \Pr(e_{i1} > e_{i0})$$

$$= \Pr(\alpha_1 c_i + \beta_1 p\_ad_i + \gamma_1 in_i + \delta_1 s_i + \varepsilon_1 ed_i + \theta_{i1} > \alpha_0 c_i + \beta_0 p\_ad_i + \gamma_0 in_i + \delta_0 s_i + \varepsilon_0 ed_i + \theta_{i0})$$

$$= \Pr\left[(\theta_{i0} - \theta_{i1}) < c_i\ (\alpha_1 - \alpha_0) + p\_ad_i(\beta_1 - \beta_0) + in_i(\gamma_1 - \gamma_0) + s_i(\delta_1 - \delta_0) + \varepsilon_1 ed_i\ (\varepsilon_1 - \varepsilon_0))\right]$$

The model is put into use by specifying a density for the random variable $(\theta_{i0} - \theta_{i1})$

The logit model is obtained by assuming that the errors $(\theta_{i0} - \theta_{i1})$ follow a logistic distribution who's cdf $F_L(\theta_{i0} - \theta_{i1})$ and pdf $f_L(\theta_{i0} - \theta_{i1})$ are explicitly available:

$$F_L(\theta_{i0} - \theta_{i1}) = (1+e^{-v_i})^{-1}$$

$$f_L(\theta_{i0} - \theta_{i1}) = F_L(\theta_{i0} - \theta_{i1})[1 - F_L(\theta_{i0} - \theta_{i1})]$$

The logistic distribution is symmetric with mean 0, variance $\pi^2/3$ with heavier tails than normal distribution. The tail mass makes it more likely to observe "non-conforming" behavior such as choosing $y_i=0$ or large positive $f(c_{ij}, ad_{ij}, in_{ij}, s_{ij}, ed_{ij})$ or $y_i=1$ for large negative $f(c_{ij}, ad_{ij}, in_{ij}, s_{ij}, ed_{ij})$.

Thus, the logit model used to evaluate employment trends among new graduates is:

$$\text{logit}(y_i) = \alpha coop_i + \beta pro\_ad_i + \gamma indiv_i + \delta soc_i + \varepsilon edu_i + \theta_i$$

Method

To pursue how employment varies with regards to the inputs of the employment framework, three independent variables distinguish the logistic function: "Labour force status of 1995 graduates in the 1997 survey reference week", "Labour force status of 1995 graduates during the 2000 survey reference week" and whether or not the graduate was employed between 1997 and 2000 with the same employer.

The three binary employment response variables are used to determine the relevance of the variables cooperative education and adding an education certification to

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the program graduated in 1995. Using the three binary employment variables, three regressions are set up using the logistic model. The dependent variables in the first two regressions are the variables "Labour force status of 1995 graduates in the 1997 survey reference week", and "Labour force status of 1995 graduates during the 2000 survey reference week." The benefit of using these variables for employment status is that they offer a complete picture of employment, whether it is full time or part time, or whether or not it is related to the graduate's field of study.

The same model for employment is then used with the third dependent variable, "Employment status-the 2000 survey reference week vs the 1997 survey reference week" to observe how significant the retention of employment is for those with coop education and those who added additional education qualifications to their education. The binary variable is constructed using the categorical variable, "Employment status-the 2000 survey reference week vs the 1997 survey reference week" and is transformed contingent on whether or not the graduate was working with the same employer at the times interviewed. This paper specifies whether or not the graduate worked for the same employer in the two surveyed reference weeks.

Cooperative education should increase the probability of a new graduate obtaining employment because, among other things, the individual now has experience within their field before they graduate. It is, therefore, pertinent to find out exactly how employment varies with the utilization of cooperative education. Using the model for employment and controlling for all other variables in the framework, the effect of cooperative education on employment can be estimated for each of the dependent variables.

It is imperative that randomization occurs in the employment framework of the sample between cooperative education and non-cooperative education to ensure that the effect on employment is estimated precisely. In most cases, cooperative education is not skewed one way or the other across the means of the variables in the employment framework, as indicated in the first four data tables of this report. This report, therefore, suggests that the sample and the population, for the most part, is randomly split in relation to cooperative education.

Alongside finding the relevance of coop in the employment of new graduates, this report also compares employment of these students to that of those who pursue further education after graduation. The model of employment is again used, and the effect of adding additional education certification is estimated alongside the effects of cooperative education for each of the independent variables.

Once again, it is imperative that randomization occurs in the employment framework of the sample between adding an education certification and not adding an education certification to the individual's 1995 graduation program. In most cases, adding an education program is not skewed one way or the other across the means of the variables in the employment framework; a special note should be made here that adding education certification seems to be skewed one way across most ability traits. It would seem that the better an individual was at achieving a certain trait, the more likely they were to add to their education. More details can be found in Table 2.

Various socioeconomics factors are also included in the logistic regression grouped in the term "soc"; specifically, the individual variables can be found in Table 1

in the Data section of this report. These factors help control the analysis based on the socio-economic factors that contribute to employment status.

Also included in the logistic regression are factors derived from the individual's characteristics grouped in the term "indiv." These factors are used to control the logistic regression for traits of an individual that may make them more employable. Those traits can be found in Table 2 in the Data section of this report.

All classes of programs that were graduated in 1995 are also included in the regression; they are grouped in the logistic regression with the term "edu." These are included in the regression because employment is a function of the knowledge the individual has; this knowledge varies across programs. That is to say, the knowledge gained in certain programs are can be more practical or make a graduate more employable.   More generally the term "edu." helps control for employment as a function of an individual's knowledge.

From previous findings[23] it is expected that coop placements will have a different affect based on the program of study; therefore, interaction terms are included in the logistic regression to determine the significance of the interaction between the program studied and cooperative education. By including the interaction terms, estimates of their relevance on employment can be performed to analyze which programs include coop most effectively in relation to the employment statistics.

To compare how cooperative education varies with adding an education certification to the program graduated in 1995, interaction terms for adding education by

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[23] Blair, B., Millea, M., and Hammer, J. (2004) 'The Impact of Cooperative Education on Academic Performance and Compensation of Engineering Majors' *Journal of Engineering Education* ,93 (4).

program are included in the logistic regression. Then, by observation of coefficients, a comparison between the interaction terms "coop by program" and "adding an education certification by program" within each model can be performed.

The standard errors are clustered by program. It is apparent that there is a strong correlation for observations within each program. Clustering the standard errors reduces the likelihood of inter-program correlation.

Three robust tests were performed: one to exclude the group of coop interaction terms and a second test to exclude adding an education certification interaction terms. A final robust test was also done without any of the interaction terms. In this final test, the regression odds ratios change dramatically as seen in the appendix. This may be considered as a result of under specification of the regression model.

A brief note on the challenge of having too few observations for a select few of the interaction terms. "Education x $coop_i$" and "social sciences x $coop_i$" are excluded from the logistic model when the dependent variable is "Labour force status of 1995 graduates in the 2000 survey reference week" for having too few observations. "Fine arts x $coop_i$" is excluded from the logistic model when the dependent variable is "Labour force status of 1995 graduates in the 1997 survey reference week" and when the dependent variable is "Labour force status of 1995 graduates in the 2000 survey reference week" for having too few observations. "Health x added $education_i$" is also included from the logistic model when the dependent variable is "Labour force status of 1995 graduates in the 2000 survey reference week". Finally, the interaction terms "agriculture x $coop_i$," "no specialization x $coop_i$" and "no specialization x pro_ad_i" were excluded across all three dependent variables for having too few observations.

Data

(I) Survey Specifics

The presented research was done through the 1995 National Graduate Survey offered by special surveys division of Statistics Canada. The survey has a cross sectional design with a longitudinal follow up. The master file was used to construct most of the analysis. This survey was designed to measure short to medium term labour outcomes for Canadian postsecondary institutions. Special attention is placed on how graduates of postsecondary programs have been successful in obtaining employment since graduation. The survey is also designed to identify the relationship between the graduates' programs of study and the employment obtained, and the influence of postsecondary education on occupational achievement.

The surveyed population consists of graduates of Canadian postsecondary intuitions who completed their program requirements in 1995. The survey excludes institutions that do not follow the curriculum of publically funded institutions or programs lasting less than three months. Graduates who completed continuing education courses at universities and colleges were also excluded from the population as well as individuals who took part-time trade courses while employed full-time. There is an important distinction to be made here between continuing education courses and education certification addition because this study deals only with adding program certifications to the program graduated in 1995; it does not deal with individual courses. Those courses that were completed through continuing education are included in the

population if the student completed a second certification requirement after graduation. Persons who completed vocational programs lasting less than three months other than in the skilled trades and persons in apprenticeship programs were also excluded. Residents of the United States were not included in this sample, instead their responses are recorded in a separate survey taken in 1999.

There are two parts of the National Graduate Survey sample: a core sample and a buy in sample. The sample was drawn from a stratified systematic random sample plan based on the province of the institution, the certification level, and the field of study. Institutions who demanded better precision in estimates had the option of the buy in sample.

Data was collected through phone interviews directly from survey respondents. Responding to the survey was voluntary. The response rate was 79.6 percent.

Weighting of the sample was done to represent the population. Estimates must be weighted to represent the actual number of persons in the population. For this reason, all estimates are weighted using probability weights and the survey's weighting variable to account for the sampling fraction of the actual population.

In this survey graduates are interviewed twice, once two years after graduation then a follow up interview is performed five years after graduation. This report utilizes both surveys to discuss changes in the levels of employment over the two periods. The discussion and results are credited views of the author.

(II) Study Specifics

This paper focuses on coop so only those observations from the National Graduate Survey that distinguish whether or not coop was taken are included, all other

observations are dropped.   Coop is taken if it was specified in the program from which

the student graduated from in the year 1995, otherwise it was not taken. Specifically it is

the binary response to the question, "Did the program completed in 1995 include

cooperative education?"

This paper examines whether the subject ascertained further educational

certifications after the completion of their diploma or degree program in order to

understand the importance of a higher level of education in relation to cooperative

education when determining employment status. The variable for adding education

certification was performed in two intervals: first in the survey where the question is

asked, "Since your graduation in 1995 did you complete the requirements for any other

postsecondary certificate, diploma, or degree?" and the other in the second survey where

the question is asked, "Since June 1997 have you completed the requirements for any

other post-secondary certificate, diploma, or degree?" These questions serve as the

variable this report describes as "adding education." Only observations that distinguish

whether or not another certification was taken since graduation are included.

A countrywide analysis of cooperative education versus adding education

certification could not be performed. The main reason that certain regions were dropped

was their size in comparison to other regions. Observations from PEI and the territories

are dropped from the analysis because these regions have very small samples compared

to all other provinces.

This paper is interested in how employment changes two years and five years

after graduation as a function of cooperative education and acquiring additional program

certification after graduation. Observations considered are those that distinctly offer a

binary response to the employment question from the respondent. Specifically, this paper only selects observations from those in the labour force that yield a definite employment status response in the survey in 1997 and again in 2000.

This paper also considers the retention of employment and how it changes with coop versus the addition of an education certification. Whether or not the student had maintained employment with a specific employer between the years 1997 and 2000 provides a dependent variable for the third and final model. For this reason, only those observations included in the study are those that have definite responses to the research question of whether or not the graduate worked with the same employer in each survey, 1997 and 2000.

(III) Statistic Analysis

This section puts forth a summary of statistics that make up the employment model. For tables one to four, each table collects variables found in the employment model by a particular motif. Within each table, the associated variables are given in the first column. The second and third columns divide that variable by whether or not coop was taken. The stated value is the mean of the variable found in column one conditional on whether or not coop was taken, for example in column two coop was taken and in column three coop was not taken. So the values in column two are for the variable in column one containing only observations where students took coop, and the values in column three are for the variable in column one containing only observations where coop was not taken. Likewise, column four and five are conditional on whether or not a certification was added to the program graduated in 1995. Column six is the number of observations for the variable found in column one. An F-test is preformed for column

seven where the equality of means in column two and three is subject to equality. The

stated p-value signifies the probability that the means are equal. Likewise column eight

states the p-value for the test of mean equality for column four and five.

Most of the variables found in column one in the next few charts are binary with

values that range between zero and one. If the variable is not binary, it is mentioned what

is implied by the stated value of the mean.

Finally, standard errors are in parenthesis. These values calibrate the spread of

values for the variable found in column one around the associated mean. Correlation

between observations is suspect across programs and for this reason standard errors are

clustered by program region.

Table 1 offers a break down of key characteristics to the study, in particular, Coop

and Adding an Education Certification and how the means of each are split among the

other variables.

TABLE 1 – STUDY FUNDAMENTALS

	Coop	Non Coop	Certification Addition	No Certification Addition	Obs.	*p-value*	*p-value*
	(1)	(2)	(3)	(4)		(1)=(2)	(3)=(4)
Coop	-	-	0.10	0.11	190851.7	-	0.33
			(0.02)	(0.02)			
Added an educational program since 1995	0.14	0.16	-	-	190851.7	0.36	-
	(0.01)	(0.02)					

Notes: p-values are from F-test of the equality of means. Means are given conditional on whether coop was taken for
(1) and (2) and means are given conditional on whether additional program certifications were acquired for (3) and (4).
Standard errors are clustered by program.
*** significant at the 0.01 level
**significant at the 0.05 level
*significant at the 0.1 level

Table 2 offers insight about employability relating to coop and adding education

certification. First note that this research denotes one as employed and zero as

unemployed and one as "held a job with the same employer" and zero as "did not hold a

job with the same employer". Now, there is a noticeable difference in whether or not

coop provides students with a job two years after graduation. There is a higher average

of students with a job signifying that there may be benefits to cooperative education. The

same can be observed five years after graduation. Furthermore, holding a job with the

same employer between 1997 and 2000 again is more favorable on average for those who

enrolled in cooperative education.

TABLE 2 – EMPLOYMENT CHARACTERISTICS

	Coop	Non Coop	Certification Addition	No Certification Addition	Obs.	*p-value*	*p-value*
	(1)	(2)	(3)	(4)		(1)=(2)	(3)=(4)
Employment Status 1997	0.93	0.92	0.89	0.93	190851.7	0.33	0.01
	(0.01)	(0.01)	(0.01)	(0.01)			
Employment Status 2000	0.97	0.96	0.96	0.96	190851.7	0.18	0.87
	(0.01)	(0)	(0.01)	(0)			
Held job with the same employer since 1997	0.48	0.45	0.33	0.48	190851.7	0.27	0.00
	(0.02)	(0.02)	(0.03)	(0.02)			

Notes: p-values are from F-test of the equality of means. Means are given conditional on whether coop was taken for
(1) and (2) and means are given conditional on whether additional program certifications were acquired for (3) and (4).
Standard errors are clustered by program.
*** significant at the 0.01 level
**significant at the 0.05 level
*significant at the 0.1 level

With regards to program certification after graduation, it would appear that

students who do not pursue program certification after graduation, on average, have

higher average employment rates in 1997 and on average, are more likely to maintain

employment with the same employer over the course of the two surveys.

A list of socioeconomic variables that contribute to employability are included in

Table 3. Most of the variables in Table 3 are binary, where one indicates "yes" and zero

indicates a "no". A special note is made here for the variables that are not binary.

Mother's and Father's education level are categorical variables ranging from no

education at zero to the level of Post Doc at twenty. A mean of between six and seven

lies between "having some trade education" and "having a trade diploma"; this is ranked

less than "having some college education" when the education level is held at eight.

TABLE 3 – SOCIOECONOMIC CHARACTERISTICS

	Coop	Non Coop	Certification Addition	No Certification Addition	Obs.	*p-value*	*p-value*
	(1)	(2)	(3)	(4)		(1)=(2)	(3)=(4)
Sex of Respondent	0.50	0.40	0.36	0.42	190851.7	0.03	0.16
	(0.08)	(0.05)	(0.05)	(0.06)			
Canadian Status	1.10	1.13	1.13	1.13	190625.7	0.02	0.99***
	(0.02)	(0.01)	(0.01)	(0.01)			
Have Dependant Children	0.29	0.34	0.28	0.35	190851.7	0.11	0.00
	(0.02)	(0.03)	(0.03)	(0.02)			
Applied for a Loan to Fund Education	0.41	0.43	0.46	0.43	190851.7	0.40	0.09
	(0.02)	(0.02)	(0.01)	(0.02)			
Father's Education Level	6.93	7.30	8.06	7.12	189403.8	0.15	0.00
	(90.33)	(0.23)	(0.22)	(0.23)			
Mother's Education Level	6.45	6.60	7.06	6.50	187343.8	0.50	0.01
	-0.21	(0.21)	(0.19)	(0.18)			

Notes: p-values are from F-test of the equality of means. Means are given conditional on whether coop was taken for (1) and (2) and means are given conditional on whether additional program certifications were acquired for (3) and (4). Standard errors are clustered by program.
*** significant at the 0.01 level
**significant at the 0.05 level
*significant at the 0.1 level

These traits offer a discussion of randomization. Students who enter coop do so in a

random fashion. It is evident that there is no clear difference in socio-economic variables

between the means with respect to those who take cooperative education and those who

do not. This randomization can be seen in Table 4 as well. It illustrates that cooperative

education is randomized among the skill levels of students too. In most cases we see no

significant difference between the cooperative education group compared to the non-

cooperative education group. Student characteristics are homogenous across groups.

The same can be said for the randomization of adding a program certification

after graduation. The means of socioeconomic characteristics are not skewed one way or

the other in general and in most cases the p-value signifying the difference of the means

TABLE 4 - INDIVIDUAL ABILITIES

	Coop	Non Coop	Certification Addition	No Certification Addition	Obs.	*p-value*	*p-value*
	(1)	(2)	(3)	(4)		(1)=(2)	(3)=(4)
Did any job last 6 months or more	0.51	0.64	0.56	0.63	120287.1	0.02	0.00
	(0.03)	(0.03)	(0.04)	(0.03)			
Ability to write clearly and concisely	1.85	1.76	1.71	1.77	190416.7	0.14	0.00
	(0.04)	(0.04)	(0.05)	(0.04)			
Ability from education or training	1.78	1.70	1.62	1.72	188345.9	0.13	0.01
	(0.05)	(0.04)	(0.05)	(0.04)			
Ability to analyse or think critically	1.73	1.72	1.70	1.72	190426.3	0.81	0.04
	(0.05)	(0.01)	(0.02)	(0.01)			
Ability to solve problems effectively	1.77	1.78	1.76	1.78	190283.2	0.40	0.09
	(0.05)	(0.02)	(0.04)	(0.02)			
Ability to work effectively with others	1.58	1.57	1.53	1.58	190264	0.60	0.01
	(0.04)	(0.03)	(0.03)	(0.03)			
Ability to learn and use new technology	0.50	0.44	0.42	0.45	173601	0.19	0.06
	(0.04)	(0.02)	(0.02)	(0.03)			

Notes: p-values are from F-test of the equality of means. Means are given conditional on whether coop was taken for
(1) and (2) and means are given conditional on whether additional program certifications were acquired for (3) and (4).
Standard errors are clustered by program.
*** significant at the 0.01 level
**significant at the 0.05 level
*significant at the 0.1 level

is found to be insignificant. Although after observing Table 4, the same cannot be said.

In this table abilities of the individual are listed on the left hand side of the table and

means are grouped by cooperative education, non-coop, certification addition, and no

certification addition. It is apparent that those who do not add to their program

certification are found to have means that are at lower levels of all of the ability variables,

which translate to a lower level of excellence, compared to those who do add program

certification. This does indicate that the stronger one's abilities are, the more likely they are to pursue further certification thus skewing the results of randomization.

Again, a special note should be made here regarding Table 4 in relation to the variable means that are being discussed. In all cases other than the "ability to use technology" and "did any job last 6 months or more," which are binary variables, the variables being summarized are categorical variables with four responses where one is the highest and four is the lowest. A mean between one and two represents an ability that is between excellent and good.

For tables five and six, the variables program and provinces are summarized respectively to show how coop and adding education certification varies. Again column one lists the variables; now column two gives the mean of the variable in column one conditional on cooperative education, where zero is "non-coop" and one is "coop". Next, column three gives the mean of the variable conditional on adding education certification, where zero is "did not add education certification" and one is "added an education certification". Finally, column four gives the number of observations for each variable in column one.

Table 5 offers a summary of how programs are split by coop, and adding education certification. After observation of the certification addition column, it can be easily stated that within the population, those who select Humanities, Fine Arts, and Social Sciences as the program graduated in 1995, on average, have the highest rate of obtaining another certification after graduation. While those who enroll in Commerce, Education and Science Technologies have the highest rate of not obtaining another certification.   In relation to the coop column, those who select Science Technologies,

TABLE 5 – PROGRAM ENROLLMENT BY COOP GROUP AND CERTIFICATION ADDITION

Program	Coop	Certification Addition	Obs.
Education	0.09	0.11	2,665.8
Fine Arts	0.07	0.19	600.7
Humanities	0.05	0.26	1,571.3
Social Sciences	0.06	0.20	3,380.4
Commerce	0.13	0.13	3,289.4
Agriculture	0.08	0.17	821.5
Engineering	0.20	0.08	862.3
Sci-Technologies	0.20	0.12	1,390.9
Health	0.07	0.15	1,820.3
Math/Physics	0.21	0.13	650.1
No Specialization	0.03	0.28	354.3

Notes: Means are taken with respect to Coop in column 2 and with respect to Certification Addition in column 3.

FIGURE 1 AVERAGE COOP INTAKE BY PROGRAM
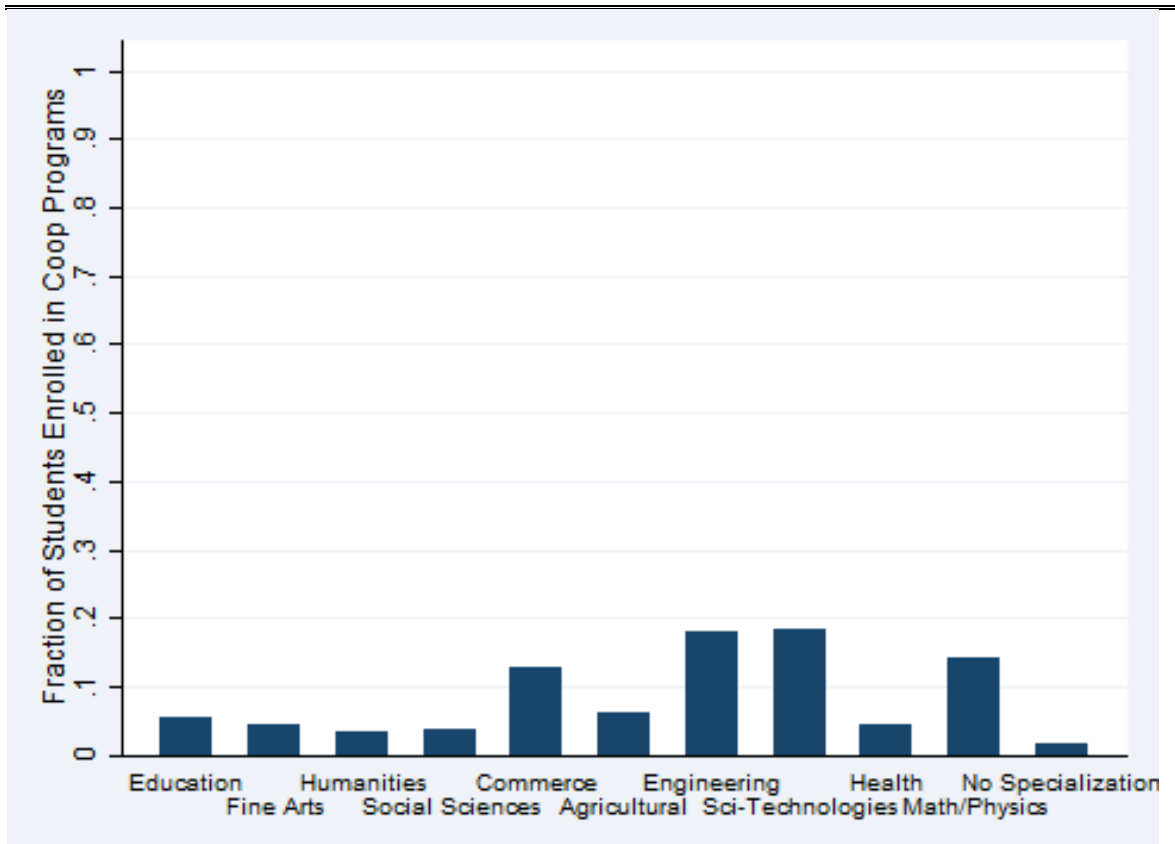
The population is broken down by program with each bar representing a different program. The height of each bar represents the fraction of students enrolled in a cooperative education in that program. A value of one represents the entire population. Thus, one minus the fraction enrolled in cooperative education would yield the fraction of students who are not enrolled in cooperative education.

Math and Physics program, on average, are more likely to be enrolled in a cooperative

education program. While those who select Humanities, Social Sciences, and No

Specialization on average are least likely to be enrolled in a cooperative education program.

Figure 1 displays this information in a bar chart through the fraction of students enrolled in Cooperative education by program. To find the fraction of students in a particular program who did not take cooperative education simply take the given fraction and subtract it from 1. From the chart it is clear that cooperative education intake has a much lower volume of students than its non-cooperative education counterpart.

Table 6 offers detailed information about the provinces of Canada. PEI and the Territories were excluded from the analysis due to their sample size. It can be easily stated after observation of the Certification Addition column that across the country, students in Newfoundland and Ontario have the highest average number of certification additions, while those students in Saskatoon have the least.

TABLE 6 – PROVINCE ENROLLMENT BY COOP GROUP AND CERTIFICATION ADDITION

Province	Coop	Certification Addition	Obs.
Newfoundland	0.14	0.19	220.1
Nova Scotia	0.10	0.16	589.8
New Brunswick	0.05	0.13	385.5
Quebec	0.04	0.13	4951.7
Ontario	0.16	0.19	7068.9
Manitoba	0.08	0.13	576.9
Saskatoon	0.08	0.12	508.8
Alberta	0.05	0.13	1519.3
Brittish Columbia	0.09	0.16	1608.1

Notes: Means are taken with respect to Coop in column 2 and with respect to Certification Addition in column 3.

This information is clearly presented in Figure 2. To find the fraction of students in a particular province who did not take cooperative education, simply take the given fraction and subtract it from 1. Again, from the chart it is clear that cooperative education intake has a much lower volume of students than its non-cooperative education counterpart.

FIGURE 2 AVERAGE COOP INTAKE BY PROVINCE
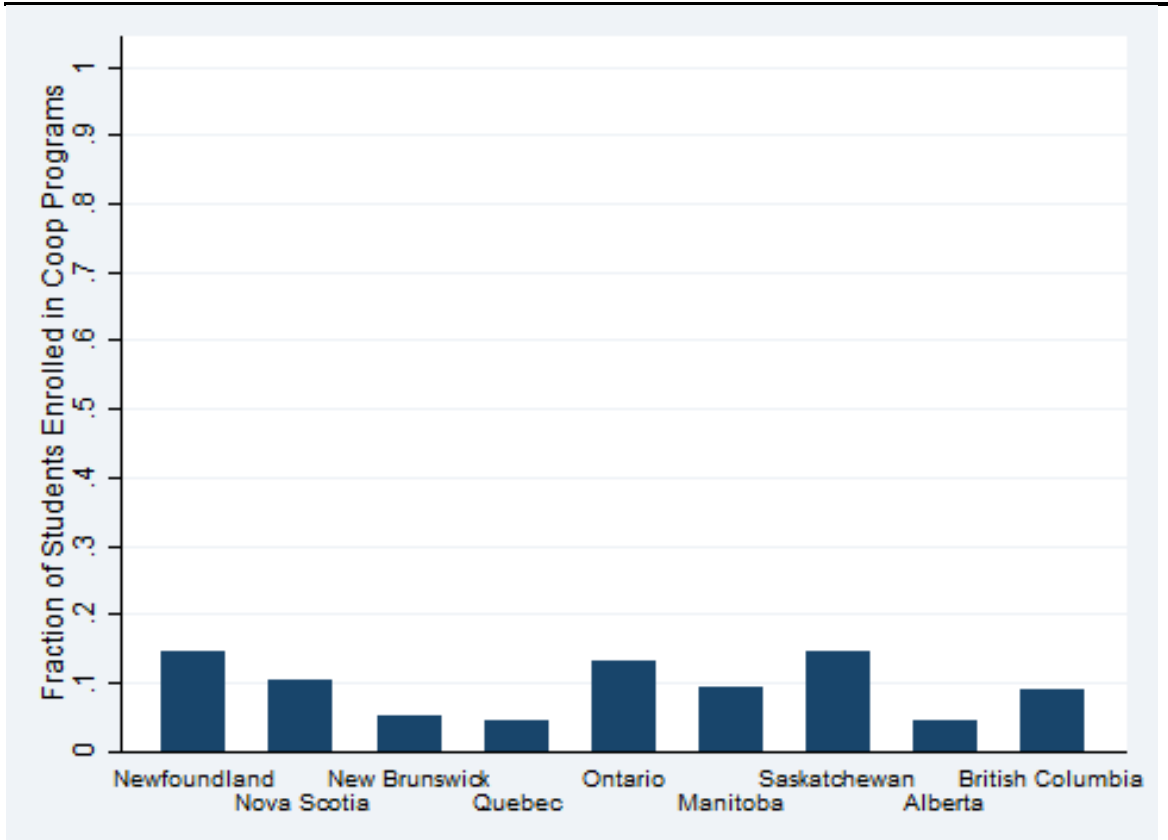
The population is broken down by program with each bar representing a different province. The height of each bar represents the fraction of students enrolled in a cooperative education in that program. A value of one represents the entire population. Thus, one minus the fraction enrolled in cooperative education would yield the fraction of students who are not enrolled in cooperative education.

Findings

Does cooperative education really make a difference on employment status?

The following tables illustrate how the logistic model performed depending on the dependent variables listed in the first row of each chart. Variables from the employment framework are listed in the first column. Their odds ratios are estimated and stated in the subsequent columns; the odds ratios vary depending on the dependent variables used in the model. In parenthesis directly below each of the odds ratio estimations t-statistics are listed. Standard errors are clustered by program.

From Table 7 it is easily observed that cooperative education plays a large role in the likelihood of employment two years after graduation and five years after graduation. The odds ratios of cooperative education are, by far, the largest found in the model. This would indicate that cooperative education has the highest contribution to employment status compared to all other variables found in the model. The estimation is also found to be significant with 99% confidence. As for the retention of employment versus the employability of contract work, this report finds that cooperative education plays a minimal role in retaining employment with the same employer. There could be many reason for this including networking connections gained from a coop program.

TABLE 7-STUDY FUNDAMENTALS OF THE LOGISTIC REGRESSION

	Employment Status in 1997	Employment Status in 2000	Employed with the same employer in 1997 and 2000
Coop	15.20***	15.36***	0.00626
	(14.76)	(15.66)	(0.02)
Certification Addition	0.512***	-0.401***	-0.349***
	(11.21)	(-5.39)	(-7.31)
N	10271	10049	10327

Notes: Odds ratios are presented in column two, three and four depending on the dependent variable used in the model. T-statistics are given in parenthesis. Standard errors are clustered by program.
*** significant at the 0.01 level
**significant at the 0.05 level
*significant at the 0.1 level

Certification addition can easily be identified as having a very small effect on the likelihood of employment two years after graduation, and an even smaller effect on employment five years after graduation in comparison to the variable of cooperative education. Certification addition may have a low effect on employment because the individual may simply be searching for adequate employment. It may also be that the individual is not ready to find a job and that is why they pursued more education to begin with. With respect to the retention of employment, certification addition again plays a

TABLE 8- CONTROL VARIABLES OF THE LOGISTIC REGRESSION

	Employment Status in 1997	Employment Status in 2000	Employed with the same employer in 1997 and 2000
Had job last 6 months or more	0.399**	0.510**	0.431***
	(2.69)	(2.93)	(3.47)
Writing Ability	-0.0205	0.274*	0.0427
	(-0.29)	(2.35)	(1.34)
Ability from Education	0.0633	0.118	0.0517
	(1.2)	(0.94)	(1.5)
Thinking ability	-0.00204	-0.0629	-0.0254
	(-0.02)	(-0.38)	(-0.43)
Problem solving ability	0.0411	-0.0502	0.0585
	(0.3)	(-0.30)	(0.9)
Ability to work with others	-0.148	-0.126	-0.024
	(-1.66)	(-0.94)	(-0.51)
Ability to use new technology	0.229*	0.177	0.259***
	(2.29)	(0.92)	(3.42)
Province	0.00597*	-0.00163	-0.00307
	(2.43)	(-0.21)	(-1.31)
Gender	0.624***	0.22	0.00507
	(5.67)	(1.06)	(0.09)
Canadian Citizen	0.253	-0.108	0.0245
	(1.05)	(-0.38)	(0.18)
Have dependent Children	·0.476***	0.0233	0.369***
	(-7.67)	(0.09)	(10.03)
Applied for student loan	-0.0656	-0.209	-0.263***
	(-0.55)	(-1.09)	(-4.08)
Father's education level	-0.0145	-0.021	-0.0215***
	(-0.85)	(-1.21)	(-6.30)
Mother's education level	0.00748	0.0152	-0.000735
	(0.57)	(0.99)	(-0.13)
N	10271	10049	10327

Notes: Odds ratios are presented in column two, three and four depending on the dependent variable used in the model.
T-statistics are given in parenthesis. Standard errors are clustered by program.
*** significant at the 0.01 level
**significant at the 0.05 level
*significant at the 0.1 level

very small role. Certification addition may relate to the pursuit of contract work, in that, students who upgrade their skills move on to a job that requires those skills. Initially, it was thought that adding education certification would allow students to rise in the ranks of a company or become more valuable by their employer because of the skills they obtained. Of course after this analysis this is considered not the case. Finally, it is important to note here that the estimation is found to be significant with 99% confidence across all three dependent variables.

After observing other variables in Table 8, it is interesting that not all variables perform the way that one would expect. For example Mother's and Father's education level play a relatively small role in the likelihood of employment two years and five years after graduation, while others are more intuitive. For example, the ability from education plays a comparatively large role in all variations of the dependent variable.

A key question regarding today's education structure is how to educate in a way that offers payback to those who are becoming educated and how those who are educated benefit the economy at large. This research turns to an analysis of education programs to discover where the payoffs are the highest, or in other words, among which programs is employment more pronounced.

From Table 9 comparatively, the answer to which program offers the highest likelihood of employment two years after graduation given one's educational background is first Engineering, followed by Science Technologies and finally Social Sciences. The same is not true five years after graduation where programs are ranked: Engineering, Health, and finally Math and Physics. This is an interesting set of

statistics to students who go to school to become employed after graduation; they are

more likely to find jobs with enrolment in these programs.

	Employment Status in 1997	Employment Status in 2000	Employed with the same employer in 1997 and 2000
Education	0.858**	2.719***	0.202
	(2.70)	(5.89)	(0.97)
Fine Arts	1.290***	2.326***	-0.602**
	(3.86)	(4.58)	(-2.88)
Humanities	1.490***	2.970***	-0.272
	(4.60)	(6.26)	(-1.27)
Social Sciences	1.777***	3.114***	-0.307
	(5.67)	(6.55)	(-1.46)
Commerce	1.538***	3.288***	-0.354
	(4.60)	(7.06)	(-1.63)
Agriculture	1.658***	2.760***	-0.502*
	(4.69)	(5.57)	(-2.43)
Engineering	2.382***	4.304***	-0.171
	(6.64)	(9.01)	(-0.88)
Sci-Technologies	1.948***	2.963***	-0.386
	(6.09)	(6.29)	(-1.77)
Health	1.515***	3.868***	-0.0662
	(4.67)	(8.24)	(-0.31)
Math and Physics	1.716***	3.299***	-0.270
	(4.72)	(7.24)	(-1.31)
No Specialization	1.080***	3.107***	-0.117
	(3.39)	(6.33)	(-0.52)
N	10271	10049	10327

TABLE 9–PROGRAM OUTPUT OF THE LOGISTIC REGRESSION

Notes: Odds ratios are presented in column two, three and four depending on the dependent variable used in the model.
T-statistics are given in parenthesis. Standard errors are clustered by program.
*** significant at the 0.01 level
**significant at the 0.05 level
*significant at the 0.1 level

With respect to the retention of employment with the same employer, it is clear

that education has the highest likelihood. This may be because many of those employed

in the education sector are employed by the government and have a strong union. Those

who are in Health are second, also because the government employs them. Finally,

Engineers have the next likelihood of maintaining employment with the same employer

based on program. This may be a result of their skills, knowledge and ability might be easier to recognize given the genre of work they undertake.

TABLE 10- COOP CROSS TERMS OF THE LOGISTIC REGRESSION

	Employment Status in 1997	Employment Status in 2000	Employed with the same employer in 1997 and 2000
Education x Coop	-13.48***	-	-0.420
	(-13.03)	-	(-1.18)
Fine Arts x Coop	-	-	1.402***
	-	-	(4.00)
Humanities x Coop	-16.11***	-14.73***	0.0550
	(-15.81)	(-14.89)	(0.16)
Social Sciences x Coop	-15.70***	-	-0.191
	(-15.16)	-	(-0.54)
Commerce x Coop	-14.85***	-14.17***	0.170
	(-14.54)	(-14.24)	(0.48)
Engineering x Coop	-15.73***	-17.24***	0.0604
	(-15.15)	(-17.51)	(0.17)
Sci-Technologies x Coop	-14.66***	-12.13***	0.142
	(-14.28)	(-12.55)	(0.40)
Health x Coop	-15.15***	-17.43***	0.813*
	(-14.62)	(-17.27)	(2.35)
Math and Physics x Coop	-14.02***	-13.35***	0.195
	(-13.63)	(-13.45)	(0.55)
N	10271	10049	10327

Notes: Odds ratios are presented in column two, three and four depending on the dependent variable used in the model. Fine Arts x Coop was excluded from the regression when the dependent variable is Employment Status in 1997 for having too few observations. Education x Coop, Fine Arts x Coop and Social Sciences x Coop was excluded from the regression when the dependent variable is Employment Status in 2000 for having too few observations. T-statistics are given in parenthesis. Standard errors are clustered by program.
*** significant at the 0.01 level
**significant at the 0.05 level
*significant at the 0.1 level

When one considers the payoff of an education program and coop simultaneously, the question of where the highest payoff exists among programs can be considered. Table 10 displays contributions to the likelihood of employment given interactions between cooperative education and education programs. These interactions are listed in column one. It is evident that across programs, those students who take coop in the programs of Education, Math and Physics, followed by Science Technologies have the highest

likelihood of employment two years after graduation. A similar list of programs can be found to have the highest likelihood of employment five years after graduation as well. The programs where coop was most relevant in the likelihood of retaining employment were Education, Health, followed by Engineering.

TABLE 11- ADDING EDUCATION CROSS TERMS OF THE LOGISTIC REGRESSION

	Employment Status in 1997	Employment Status in 2000	Employed with the same employer in 1997 and 2000
Education x Education Added	-0.139*	-0.199	0.135**
	(-2.42)	(-1.44)	(2.80)
Fine Arts x Education Added	-2.497***	-1.517***	-0.675***
	(-35.31)	(-10.81)	(-11.91)
Humanities x Education Added	-1.304***	0.0105	0.122**
	(-33.70)	(0.13)	(2.58)
Social Sciences x	-0.564***	1.330***	-0.120**
Education Added	(-9.05)	(15.50)	(-2.69)
Commerce x Education Added	0.727***	0.759***	0.192***
	(9.54)	(8.25)	(4.47)
Agriculture x Education Added	-0.926***	1.335***	0.721***
	(-10.51)	(10.93)	(11.24)
Engineering x Education Added	-1.533***	0.754***	-0.539***
	(-20.87)	(8.39)	(-8.83)
Sci-Technologies x	-1.323***	-0.346***	-0.291***
Education Added	(-29.99)	(-3.84)	(-6.04)
Health x Education Added	-0.342***	-	0.180***
	(-4.57)	-	(5.04)
Math and Physics x	-0.873***	-0.135	-0.597***
Education Added	(-18.69)	(-1.39)	(-10.65)
N	10271	10049	10327

Notes: Odds ratios are presented in column two, three and four depending on the dependent variable used in the model. Health x Education Added was excluded from the regression when the dependent variable is Employment Status in 2000 for having too few observations. T-statistics are given in parenthesis. Standard errors are clustered by program.
*** significant at the 0.01 level
**significant at the 0.05 level
*significant at the 0.1 level

Finally, the question persists of how employment changes with the interaction of adding education to one's program of study. This question offers insight to how the likelihood of employment changes with this additional certification. Table 11 lists this information with the program in the first column. It can be observed that the most

relevant program to the likelihood of employment two years after graduation, where graduates added an educational certification, was Commerce followed by the program Education. The most relevant programs to increase the likelihood of employment five years after graduation were Agriculture and Social Sciences where students added an education certification. The retention of employment was most effective in Agriculture followed by Commerce.

Conclusion

In the changing global structure, the prevailing education system plays a major role in production and development. Many advancing primary and secondary resource economies are upgrading their education systems to mock those economies that are knowledge based. Moving forward, it is important to continually upgrade and change the education system to keep up with global technologies relating to this infrastructure. Coop is just one of them.

It has been found that cooperative education plays a major role in the likelihood of employment of new graduates two years and five years after graduation, while the effects of adding an education certification to ones credentials has been found to have a lesser affect. It is important to consider that depending on program studied, the affects of coop and adding education certification vary.

Research that focuses on education intuitions and labour force efficiency are important going forward. Today, there is little cooperative education being offered. It is predominantly found in select parts of Canada with very little evidence in other regions.

There are social gains ahead by evolving the labour-education infrastructure to include this technology.

Cost in relation to benefits may also get the attention of policy makers. Currently there is an intuitive loss related to the focus of employment in relation to program studied. One in three graduates do not find a job in their field of study. This could be modeled to add to the analysis of this paper.

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