Estimating the Net Benefits of Bachelor Degrees: Data Challenges and Importance

Alice Nakamura (University of Alberta, Canada), Arthur Sweetman (McMaster University, Canada), Kyle Phong (University of Alberta, Canada), Philip Davidson (University of Alberta, Canada), Kevin Lang (Boston University, United States) and Leonard Nakamura (Federal Reserve Bank of Philadelphia, United States)

Paper prepared for the 34th IARIW General Conference

Dresden, Germany, August 21-27, 2016

Session 6E: Research Statistics Required to Support Higher Education Decision Making

Time: Thursday, August 25, 2016 [Afternoon]

Estimating the Net Benefits of Bachelor Degrees: Data Challenges and Importance

Alice O. Nakamura,[1][2] Leonard I. Nakamura,[3] Arthur Sweetman,[4] Kevin Lang,[5] Kyle Phong[6] and Phillip R. Davidson[7]

Abstract

Now, as before, the available data show that those who earn at least a bachelor's level university degree have higher earnings on average, and multiple other sorts of better labor market outcomes on average, than those with community college, technical school, or high school educations but no university degree. Yet calls for diverting more of those seeking university educations to alternative education programs or for changing how bachelor's degrees are delivered are persistent and strong now. This paper explores the sorts of empirical evidence behind the calls for change, proposes an alternative explanation of the causes of the media reports and public attitudes toward research universities despite the evidence of job market success for graduates, and notes that the ways of dealing with this situation that could work differ depending on the causes. A list of types of initiatives that faculty members could take that might help is given.

1. Introduction

As Paul Davenport (2001), a former president of the University of Alberta and also of the University of Western Ontario, has pointed out:[8] "One of the striking attributes of the advanced economies during the last three decades has been the strong growth in demand for university graduates and university research." Now, 15 years later, a University of Alberta Institutional Strategic Planning document begins with statements that frame the puzzle we tackle in this paper. The first two sentences are:[9] "Universities are increasingly facing pressure from undergraduate and graduate students, governments, parents, and businesses to focus on educational programs that primarily prepare students for the workplace.... At the same time, employers consistently report that the knowledge and skills gained through liberal arts education, while not directed to any one particular profession, most effectively prepare students to tackle complex challenges

[1] University of Alberta School of Business, Canada, Alice.Nakamura@ualberta.ca.
[2] Corresponding author.
[3] US Federal Reserve Bank of Philadelphia, leonard.nakamura@phil.frb.org
[4] Arthur Sweetman, Department of Economics and Ontario Research Chair in Health Human Resources, McMaster University, Canada, arthur.sweetman@mcmaster.ca.
[5] Department of Economics, Boston University, US, lang@bu.edu.
[6] Department of Economics, University of Alberta, Canada, kphong@ualberta.ca.
[7] University of Alberta School of Business, Canada.
[8] Davenport, Paul (2001)
[9] https://www.ualberta.ca/strategic-plan/overview/changes-in-learning-environment/external-pressures

with critical thinking skills, creativity, and cultural sensitivity." The report goes on to state that: "The tension between career-readiness and curiosity-driven inquiry is especially acute at the doctoral level." We argue that the key to improving public support for research universities in Canada and the US is to change how the masses of undergraduates end up feeling and talking to their parents and others about their undergraduate degree experiences. We argue that the words – not just the employment outcomes – of bachelor's degree graduates are affecting public decision making about research universities. We argue, moreover, that the views that bachelor's graduates have about what their degrees can and will do for their careers are being inappropriately scripted by a body of research on overqualified university graduates that is not based on proper evidence.

We start in section 2 by examining job-market related outcomes by education level for both Canada and the US and Canada over the years of 1996-2011 for Canada and 2996-2014 for the US. In section 3 we argue that there is a conceptual error at the base of the overqualified literature statistical evidence which renders the results of that literature meaningless.

In section 4, we share ways already being used, or that could be used, and for which there is evidence from published research for increasing student engagement. We focus on ways of enhancing student engagement that could be consistent with faculty members continuing to have time for the research that leads to new knowledge production at universities. Sections 5 through 7 provide information about initiatives and problems for which resource allocations and political support are needed. Section 8 briefly concludes.

2. The Employment and Earnings Outcomes for Workers with Different Levels of Education: Canada and the US

We begin with empirical evidence on the employment outcomes for men and women in multiple age groups for Canada versus the United States (US). Those with Bachelor's degrees have higher wages on average, and they have lower unemployment rates, they are employed in higher proportions, and they participate in higher proportions in the labor force compared with those with less education. For adults who are not in school and who are 25-34 years of age – a group that has been the focus of related studies -- we document these workforce outcomes in table 1 for men and table 2 for women for 1996-2014 for the US and for 1996-2011 for Canada. Summary evidence for other age groups is presented in tables 3 through 5.

We show that those who have earned 4-year bachelor's degrees do better, on average, than those whose highest level of education is a high school diploma, a trade school diploma, or a 2-year community college diploma. Even though Canada and the US have quite different proportions of people with 4-year bachelor's degree qualifications, we show that the patterns of employment-related benefits associated with having at least a bachelor's degree level of education have been similar for both nations.

Table 1: Men, Canada and the US, 25-34

	Canada					US					
	1996	**2001**	**2006**	**2011**	**Δ1996 to 2011**	**1996**	**2001**	**2006**	**2011**	**2014**	**Δ1996 to 2014**
1. Proportion of individuals with a given level of education by age groups											
Less than high school	25.9	22.1	15.0	12.8	-13.1	9.0	8.1	7.8	7.2	6.1	-2.9
High school diploma	24.8	25.1	26.7	25.9	1.1	55.4	53.6	52.0	51.4	50.3	-5.1
Trade certificate	16.3	16.0	15.1	16.5	0.2	5.0	5.5	5.8	5.0	4.7	-0.3
College diploma	17.6	19.1	24.1	23.5	5.9	3.6	3.9	4.3	5.4	5.7	2.1
Bachelor's degree	**12.0**	**13.8**	**14.8**	**16.4**	**4.4**	**21.2**	**22.5**	**23.3**	**23.5**	**24.9**	**3.7**
Postgraduate degree	3.3	3.9	4.3	4.8	1.5	5.7	6.3	6.7	7.6	8.4	2.7
2. Employment/population rates											
Less than high school	70.9	74.5	74.7	66.0		73.0	72.3	70.9	58.8	59.6	
High school diploma	85.9	87.7	86.6	83.6		88.8	88.6	85.8	77.7	79.7	
Trade certificate	86.0	89.1	89.7	88.9		94.1	93.4	94.0	87.4	89.8	
College diploma	91.4	92.9	92.6	92.1		92.6	93.2	91.9	86.8	87.8	
Bachelor's degree	**95.0**	**94.7**	**93.8**	**94.2**		**94.3**	**93.9**	**93.0**	**90.3**	**91.7**	
Postgraduate degree	95.9	96.2	95.4	93.7		94.4	95.0	94.0	92.9	93.1	
3. Percentage Weekly Wage and Salary Premiums and Penalties relative to High School graduates											
Less than high school	-15.0	-11.2	-16.2	-15.1		-29.6	-26.4	-26.5	-27.8	-21.1	
High school diploma	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Trade certificate	9.6	11.8	13.8	19.9		15.8	14.5	14.4	19.7	20.1	
College diploma	14.9	17.7	19.3	20.7		10.2	18.9	15.4	11.3	12.6	
Bachelor's degree	**27.9**	**37.2**	**35.2**	**37.2**		**31.9**	**38.6**	**36.1**	**41.0**	**39.6**	
Postgraduate degree	41.8	43.8	46.7	42.7		51.3	54.7	53.5	62.4	62.5	
4. Unemployment rates											
Less than high school	18.0	13.4	11.5	15.8		12.0	9.9	11.6	21.6	16.4	
High school diploma	9.1	6.7	6.3	8.6		5.1	4.5	5.3	11.6	8.0	
Trade certificate	10.3	7.3	5.8	7.1		3.6	2.7	2.1	6.3	4.5	
College diploma	6.0	4.3	3.8	4.4		2.6	2.7	1.7	5.6	4.9	
Bachelor's degree	**3.1**	**2.6**	**2.8**	**3.0**		**2.1**	**2.2**	**2.3**	**4.0**	**2.7**	
Postgraduate degree	2.1	1.7	1.9	2.6		1.8	1.6	1.5	2.5	2.4	
5. Non-participation rates											
Less than high school	13.5	13.9	15.6	21.7		17.0	19.8	19.8	25.0	28.8	
High school diploma	5.5	6.0	7.5	8.5		6.3	7.2	9.4	12.1	13.4	
Trade certificate	4.1	3.8	4.8	4.3		2.4	4.0	4.0	6.8	6.0	
College diploma	2.8	3.0	3.7	3.7		4.9	4.3	6.5	8.1	7.8	
Bachelor's degree	**2.0**	**2.8**	**3.5**	**2.9**		**3.6**	**4.0**	**4.8**	**6.0**	**5.7**	
Postgraduate degree	2.0	2.2	2.8	3.8		3.8	3.5	4.6	4.7	4.7	

Source: Authors' calculations from Statistics Canada Census of Population and National Household Survey Public Use Microdata for individuals and the US Bureau of Labor Statistics Current Population Survey Merged Outgoing Rotation Groups microdata compiled by NBER.

Notes: Education level denotes the highest level of education obtained by an individual.

Table 2: Women, Canada and the US, 25-34

	Canada					US					
	1996	**2001**	**2006**	**2011**	**Δ1996 to 2011**	**1996**	**2001**	**2006**	**2011**	**2014**	**Δ1996 to 2014**
1. Proportion of individuals with a given level of education by age groups											
Less than high school	20.5	16.6	10.2	8.3	-11.7	8.4	7.1	6.6	5.8	5.5	-2.9
High school diploma	25.8	22.4	21.8	19.4	-6.4	53.8	49.8	47.0	43.8	41.2	-10.0
Trade certificate	10.6	10.6	9.1	8.3	-2.3	5.4	5.8	5.7	5.2	5.2	-0.2
College diploma	25.3	26.9	31.4	30.6	5.3	5.0	5.6	6.0	7.2	7.5	2.5
Bachelor's degree	**14.2**	**18.3**	**21.1**	**24.9**	**10.7**	**21.9**	**24.6**	**25.6**	**27.1**	**28.2**	**6.3**
Postgraduate degree	3.6	5.1	6.4	8.4	4.8	5.5	7.3	9.1	11.1	12.4	6.9
2. Employment/population rates											
Less than high school	48.3	54.9	51.8	44.3		44.7	50.6	46.2	38.4	39.1	
High school diploma	70.2	72.9	72.1	69.2		71.1	72.3	69.8	63.9	64.3	
Trade certificate	72.7	78.4	78.8	81.0		81.8	82.0	81.3	78.8	78.5	
College diploma	82.2	83.5	84.0	84.8		81.9	80.3	79.3	75.5	78.0	
Bachelor's degree	**89.6**	**88.9**	**88.2**	**90.0**		**83.7**	**82.2**	**83.0**	**81.8**	**82.8**	
Postgraduate degree	91.3	89.7	90.4	91.8		89.7	87.8	89.3	87.8	89.4	
3. Percentage Weekly Wage and Salary Premiums and Penalties relative to High School graduates											
Less than high school	-20.2	-17.2	-33.0	-30.3		-38.6	-35.1	-30.3	-33.6	-29.5	
High school diploma	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Trade certificate	-1.6	-1.7	-6.5	-3.0		21.5	14.1	19.2	19.6	17.8	
College diploma	23.5	24.4	30.5	23.9		25.4	17.1	19.0	17.8	16.9	
Bachelor's degree	**50.3**	**56.9**	**67.6**	**59.2**		**46.5**	**48.3**	**47.6**	**50.6**	**55.0**	
Postgraduate degree	63.0	70.1	75.0	64.4		73.2	67.3	71.7	78.1	80.9	
4. Unemployment rates											
Less than high school	18.5	13.6	14.9	16.0		15.6	13.8	14.8	23.7	18.5	
High school diploma	9.5	7.4	7.9	9.3		6.0	5.4	5.9	11.3	8.8	
Trade certificate	10.4	7.1	6.9	5.9		3.6	3.2	3.7	7.6	5.9	
College diploma	6.6	5.0	5.1	5.3		2.9	3.2	2.8	6.1	4.6	
Bachelor's degree	**3.9**	**3.5**	**3.6**	**3.6**		**2.3**	**2.5**	**2.0**	**3.7**	**3.4**	
Postgraduate degree	3.1	3.6	3.8	3.3		1.8	1.7	1.4	2.6	1.8	
5. Non-participation rates											
Less than high school	40.8	36.5	39.2	47.3		47.0	41.3	45.8	49.6	52.1	
High school diploma	22.4	21.3	21.7	23.7		24.4	23.6	25.9	27.9	29.5	
Trade certificate	18.8	15.6	15.4	13.9		15.1	15.3	15.6	14.7	16.6	
College diploma	12.0	12.1	11.5	10.5		15.6	17.1	18.4	19.6	18.2	
Bachelor's degree	**6.7**	**7.9**	**8.5**	**6.7**		**14.4**	**15.7**	**15.3**	**15.0**	**14.3**	
Postgraduate degree	5.8	6.9	6.0	5.1		8.6	10.7	9.4	9.8	9.0	

Source: Authors' calculations from Statistics Canada Census of Population and National Household Survey Public Use Microdata for individuals and the US Bureau of Labor Statistics Current Population Survey Merged Outgoing Rotation Groups microdata compiled by NBER.

Notes: Education level denotes the highest level of education obtained by an individual.

Table 3: Percentage Weekly Wage and Salary Premiums and Penalties relative to High School graduates, Men, Canada and the US

	Canada		US			
	1996 - 2011		1996 to 2011	2014	1996 to 2011	2014
	Men	Women	Men		Women	
20-24						
High school diploma	0.0	0.0	0.0	0.0	0.0	0.0
Trade certificate	16 to 31	2 to 10	13 to 24	26	18 to 27	25
College diploma	16 to 24	23 to 32	10 to 14	18	20 to 26	14
Bachelor's degree	**23 to 40**	**41 to 53**	**32 to 42**	**52.6**	**42 to 52**	**53**
25-34						
High school diploma	0.0	0.0	0.0	0.0	0.0	0.0
Trade certificate	10 to 20	-7 to -2	14 to 20	20	14 to 21	18
College diploma	15 to 21	24 to 31	10 to 19	13	17 to 25	17
Bachelor's degree	**28 to 37**	**50 to 68**	**32 to 41**	**40**	**47 to 51**	**55**
Postgraduate degree	42 to 47	63 to 75	51 to 62	63	67 to 78	81
35-44						
High school diploma	0.0	0.0	0.0	0.0	0.0	0.0
Trade certificate	4 to 6	-11 to -3	9 to 15	12	13 to 16	17
College diploma	14 to 19	21 to 25	17 to 19	13	17 to 20	20
Bachelor's degree	**39 to 49**	**53 to 60**	**41 to 47**	**45**	**44 to 49**	**50**
Postgraduate degree	48 to 63	72 to 75	57 to 67	63	70 to 78	75
45-54						
High school diploma	0.0	0.0	0.0	0.0	0.0	0.0
Trade certificate	-2 to 6	-11 to -7	7 to 14	10	11 to 15	11
College diploma	11 to 22	18 to 23	11 to 15	16	20 to 24	21
Bachelor's degree	**34 to 47**	**54 to 58**	**35 to 48**	**47**	**40 to 50**	**51**
Postgraduate degree	47 to 64	71 to 79	53 to 67	65	71 to 74	71
55-64						
High school diploma	0.0	0.0	0.0	0.0	0.0	0.0
Trade certificate	0 to 9	-12 to -2	3 to 12	8	12 to 17	13
College diploma	5 to 18	14 to 22	11 to 16	9	17 to 32	20
Bachelor's degree	**21 to 40**	**46 to 48**	**34 to 41**	**37**	**41 to 45**	**46**
Postgraduate degree	46 to 51	58 to 71	50 to 57	58	68 to 74	67

Source: Authors' calculations from Statistics Canada Census of Population and National Household Survey Public Use Microdata for individuals and the US Bureau of Labor Statistics Current Population Survey Merged Outgoing Rotation Groups microdata compiled by NBER. See the text for further details.

Table 4: Employment/population rates, Canada and the US

	Canada		US			
	1996 to 2011		1996 to 2011	2014	1996 to 2011	2014
	Men	Women	Men		Women	
20-24						
High school diploma	77 to 83	72 to 78	72 to 84	75	64 to 73	67
Trade certificate	83 to 87	75 to 85	88 to 97	90	81 to 88	80
College diploma	88 to 90	85 to 89	84 to 93	87	78 to 87	82
Bachelor's degree	**88 to 93**	**90 to 91**	**87 to 92**	**89**	**87 to 92**	**86**
25-34						
High school diploma	84 to 88	69 to 73	77 to 89	80	64 to 72	64
Trade certificate	86 to 90	73 to 81	87 to 94	90	79 to 82	79
College diploma	91 to 93	82 to 85	87 to 93	88	79 to 82	78
Bachelor's degree	**94 to 95**	**88 to 90**	**90 to 94**	**92**	**82 to 84**	**83**
Postgraduate degree	94 to 96	90 to 92	93 to 95	93	88 to 89	89
35-44						
High school diploma	85 to 89	75 to 78	81 to 84	82	68 to 76	69
Trade certificate	87 to 89	77 to 81	90 to 94	91	79 to 84	81
College diploma	92 to 92	83 to 86	89 to 94	89	79 to 83	76
Bachelor's degree	**95 to 95**	**86 to 88**	**92 to 96**	**93**	**79 to 81**	**80**
Postgraduate degree	95 to 96	90 to 91	94 to 97	95	84 to 88	87
45-54						
High school diploma	84 to 86	71 to77	77 to 85	78	70 to 75	68
Trade certificate	85 to 86	74 to 80	85 to 90	86	78 to 84	77
College diploma	89 to 90	80 to 85	85 to 89	86	80 to 82	76
Bachelor's degree	**92 to 93**	**86 to 88**	**90 to 93**	**91**	**79 to 83**	**80**
Postgraduate degree	94 to 96	89 to 92	94 to 95	94	86 to 89	86
55-64						
High school diploma	55 to 64	39 to 52	61 to 65	64	51 to 56	55
Trade certificate	58 to 64	47 to 53	67 to 70	69	60 to 65	65
College diploma	62 to 65	48 to 60	67 to 71	69	62 to 67	63
Bachelor's degree	**63 to 69**	**49 to 59**	**74 to 77**	**77**	**60 to 66**	**67**
Postgraduate degree	69 to 73	60 to 65	78 to 81	81	67 to 72	70

Source: Authors' calculations from Statistics Canada Census of Population and National Household Survey Public Use Microdata for individuals and the US Bureau of Labor Statistics Current Population Survey Merged Outgoing Rotation Groups microdata compiled by NBER. See the text for further details.

Table 5: Non-participation rates, Canada and the US

	Canada		US			
	1996 to 2011		1996 to 2011	2014	1996 to 2011	2014
	Men	Women	Men		Women	
20-24						
High school diploma	6 to 11	14 to 18	7.3	14	21 to 24	24
Trade certificate	4 to 5	8 to 15	1.0	5	9 to 12	14
College diploma	3 to 5	6 to 8	2.0	7	11 to 16	13
Bachelor's degree	**3 to 6**	**5 to 5**	**4.7**	**5**	**4 to 7**	**7**
25-34						
High school diploma	6 to 9	21 to 24	6 to 12	13	24 to 28	30
Trade certificate	4 to 5	14 to 19	2 to 7	6	15 to 15	17
College diploma	3 to 4	11 to 12	4 to 8	8	16 to 20	18
Bachelor's degree	**2 to 4**	**7 to 9**	**4 to 6**	**6**	**14 to 16**	**14**
Postgraduate degree	2 to 4	5 to 6	4 to 5	5	9 to 11	9
35-44						
High school diploma	6 to 9	18 to 20	8 to 12	13	21 to 26	27
Trade certificate	5 to 6	14 to 16	3 to 6	7	13 to 16	16
College diploma	3 to 5	12 to 13	4 to 6	8	15 to 18	21
Bachelor's degree	**3 to 3**	**10 to 11**	**3 to 4**	**5**	**17 to 19**	**18**
Postgraduate degree	2 to 3	7 to 8	2 to 4	3	10 to 15	11
45-54						
High school diploma	9 to 11	19 to 24	12 to 16	18	23 to 25	28
Trade certificate	8 to 9	16 to 21	7 to 10	12	14 to 18	21
College diploma	7 to 7	12 to 17	8 to 11	12	16 to 18	21
Bachelor's degree	**5 to 6**	**10 to 13**	**5 to 6**	**7**	**16 to 18**	**17**
Postgraduate degree	3 to 5	7 to 10	4 to 4	4	10 to 11	12
55-64						
High school diploma	33 to 40	45 to 58	33 to 34	33	41 to 48	43
Trade certificate	30 to 36	43 to 50	28 to 31	28	32 to 38	32
College diploma	31 to 35	38 to 49	26 to 31	28	32 to 37	34
Bachelor's degree	**30 to 35**	**39 to 49**	**21 to 24**	**20**	**30 to 39**	**31**
Postgraduate degree	25 to 32	33 to 38	17 to 21	17	27 to 31	28

Source: Authors' calculations from Statistics Canada Census of Population and National Household Survey Public Use Microdata for individuals and the US Bureau of Labor Statistics Current Population Survey Merged Outgoing Rotation Groups microdata compiled by NBER.

3. Why the Findings of the Overqualified Graduate Literature Are Plain Wrong

In November of 2015, the Canadian Parliamentary Budget Officer (PBO), [10] Jean-Denis Fréchette, released a report [Parliamentary Budget Officer (PBO) (2015); the PBO report hereafter] that claims that the proportion of workers in Canada aged 25 to 34 with a university degree who were overqualified in their current position has been on an upward trend since the early 1990s, reaching 40 per cent in 2014.

In both Canada and the US, employers have been hiring more Bachelor's degree university graduates over a long sweep of years spanning the worst recession since the Great Depression and vast changes in technology. Moreover, on average, employers pay Bachelor's degree graduates considerably more than those with less education. These are facts that can be directly observed from the data collected from workers. So how could it be that in April of 2015, the Canadian Parliamentary Budget Officer (PBO) (2015) issued a report stating that "four out of every 10 young workers with a university degree are overqualified for their job in the years after graduation."

The PBO asserts, with references to past research, that those young workers spent money, time, and resources to get those qualifications, and gave up the money they could have earned and the job experience and seniority they might have gained if they had worked full time rather than attending university. The budget watchdog conjectured that. "These workers may face lower levels of job satisfaction and attachment, which could increase turnover rates for employers" (p. 5). The PBO report references to and builds on Statistics Canada studies that report similar findings. Those Statistics Canada reports and aspects of the creation of the data for those reports build on US practices and research results, which is where we thus start.

---

[10] http://www.pbo-dpb.gc.ca/web/default/files/Documents/Reports/2015/Labour%202015/Labour_Market_Assessment_2015_EN.pdf
Labour Market Assessment 2015
Ottawa, Canada
12 November 2015
www.pbo-dpb.gc.ca

It is employers who make the hiring choices that result in people with various levels of education being observed to be in different sorts of jobs, and it is only employers who in the end can have true insight into ways in which the educations of those they hire are, or are not, useful or a meaningful factor in the hiring and the day-to-day job functions employees carry out and subsequent promotions (or not). For example, many retail establishments want to have managers who truly understand the business operations they are responsible for. A main means by which most retailers end up with managers that have that sort of understanding has always been, and still is, by making internal promotions. Thus, in hiring sales clerks, retailers often try to hire people who, if they stay with the business over time, could potentially be promoted into management positions. In other words, employers often look for qualifications in hiring that, whether or not they are needed for the initial job the person will do, are needed if that person over time proves to be someone the employer wants to promote into a management position.

For jobs where there are regulations requiring that workers have specific minimum levels of education and where those minimum levels have not changed much over the last 20 years (e.g., public school teaching), it is inevitable that most of those working in those sorts of jobs will be rightly qualified, given the methods of the overqualification literature. However, in other areas of the world of work, employers run job ads where they often try to attract more educated workers. They explain when discussing candidates with faculty members who are listed as employment references for some of those being considered that they want to hire people with skills that university graduates more commonly have developed. But the jobs are often ones that, in years past, were done mostly by those with high school qualifications. After all, back then, there were fewer university graduates available, and employers needed to hire workers from those available.

There have been no systematic employer surveys carried out in a manner that would permit comparisons to be made over time regarding how employers feel about the education qualifications of those they hire in the different areas in which that hiring has been ongoing. One reason for this reality might be the extreme difficulties that would be faced in trying to devise a

meaningful survey of this sort, including the inevitable reluctance of employers to make information of that sort public, even in responses to an official statistics agency that will protect the sources of the responses from disclosure. However, whatever the reasons, the important point here is that surveys of this sort have not been carried out, and are not the source, of the results in the literature we take up in this section on the over-qualifications of Bachelor's graduates.

3.1 The measures of "overqualification"

Two main sorts of measures have been used to try to assess the extent of over-education.

One measure involves evaluation by job analysts who come up with criteria they then use to decide what level of education is required for jobs in each occupational category, as has been done in Canada for the jobs in the NOC and the NOC-S, and in the US for the jobs in the occupational categories defined in the US Dictionary of Occupational Titles (DOT).

The second measure involves a worker's assessment of his or her own job. For example, in the US, the Michigan Panel Study of Income Dynamics (PSID) asks:

How much formal education is required to get a job like yours?

For these two measures the extent of over-education is determined by comparing the required level of education for the occupation a worker is in with that actually attained by the worker.

In our view, these sorts of data cannot show what the needs of employers are.

3.2 Data practices and research results for the US

Richard B. Freeman in his book, *The Overeducated American* (1976), presented empirical evidence that he saw as showing that the US labor market would have vast challenges employing the millions of citizens with college diplomas and advanced degrees from the enormous expansion of higher education after World War II.

Freeman's thesis that labor markets will not always be friendly to university-educated workers has been enjoying a revival. This re-consideration has gained momentum since the high

unemployment and underemployment of college graduates following the Great Recession of 2008 as well as trends in globalization that have led to the off shoring of many jobs done by lawyers, accountants, information technology workers, and other well-educated professionals.

In a review is presented of Richard Freeman's "The Overeducated American," James P. Smith and Finis Welch (1978) conclude that the data do not reveal an overeducated workforce problem, but rather relate to adjustments of larger entering cohorts. Supporting statistics are cited.

The US occupational codes are referred to as the Standard Occupational Classification System. The resulting occupational group definitions formerly were published in the various editions of the *Dictionary of Occupational Titles* (DOT), and are now published online on the website of the US Bureau of Labor Statistics (BLS).[11] [12]

The US also has the Occupational Information Network, better known as O*NET™.

Thomas Kochan (1999) explains that occupation classification systems require sufficiently large investments to create, and then to update on an ongoing basis, the descriptive job information. He states that it is inevitable that substantial portions of such as classification system will be out-of-date at any given point in time.[13]

Sicherman (1991) uses data from the Panel Study of Income Dynamics (PSID).

Some have argued that overeducated workers are underutilized workers (e.g., Rumberger 1981a).

3.3 The Canadian overqualification results

Employment and Social Development Canada publishes the National Occupational Classification Matrix (2011) which classifies each NOC code into five skill levels.

---

[11] http://www.bls.gov/oes/current/oes_stru.htm

[12] The US Department of Labor, Employment & Training Administration also sponsors the related O*NET online system, and BLS provides crosswalks between the DOT and O*NET.

[13] Thomas Kochan The Changing Nature of Work: Implications for Occupational Analysis
Committee on Techniques for the Enhancement of Human Performance: Occupational Analysis;
National Research Council 1999
https://www.nap.edu/login.php?record_id=9600&page=http%3A%2F%2Fwww.nap.edu%2Fdownload.php%3Frecord_id%3D9600
http://www.nap.edu/read/9600/chapter/7

Bachelor's Degrees 16,08.11

Using microdata from the Labor Force Survey (LFS), PBO analyzed how the educational credentials of recent university graduates corresponded with their job qualifications. The LFS provides the highest educational attainment level and the National Occupational Classification (NOC-S) for each individual in the survey. Table B-1 lists the matching of the NOC-S code reported in the LFS with the skill type identified using the NOC Matrix.

Skill 0 occupations are management occupations.

Skill A occupations usually require university education. Skill B occupations usually require college education or apprenticeship training. Skill C occupations usually require secondary school and/or occupation-specific training. Skill D requires only on-the-job training.

In this report, individuals working in management positions (Skill 0) are excluded in the calculation of overqualification. This is because the qualification required for management positions may vary across sectors. Therefore, they are considered to be "rightfully-qualified."

Finnie (2000) raised questions about the empirical basis of the early research in Canada on overqualified workers. Research since then is summarized in table 6.

Table 6. The Canadian Studies on Overqualified Workers

	Study	Data used	Definition used for overqualified workers
1.	Frenette, Marc (2000), "Overqualified? Recent graduates and the needs of their employers," *Education Quaterly Review* 7 (1), Statistics Canada Catalogue no. 81-003-XIE. 6-20. http://www.statcan.gc.ca/pub/81-003-x/81-003-x2000001-eng.pdf	National Graduates Surveys (NGS) and Follow-Ups to the National Graduate Surveys (FOG). Three cohorts of Canadian postsecondary graduates were examined: the classes of 1982 (interviewed in 1984 and 1987), 1986 (interviewed in 1988 and 1991) and 1990 (interviewed in 1992 and 1995).	The specific job requirement question used was: "When you were selected for that job, what level of education was needed to get the job?" All numbers refer to overqualification by at least one education level.
2.	Crompton, Susan (2002), "I still feel overqualified for my job," *Canadian Social Trends*, No. 67, Winter 2002, Statistics Canada, Catalogue no. 11-008-X, 23-26. http://www.statcan.gc.ca/pub/11-008-x/2002003/article/6397-eng.pdf	The 2000 General Social Survey (GSS), focusing on workers aged 20 to 64 with postsecondary qualifications.	Respondents self-identified themselves as overqualified for their job by responding to the question: "Considering your experience, education and training, do you feel that you are overqualified for your job?"
3.	Frenette, Marc (2004a), "The overqualified Canadian graduate: The role of academic program in the incidence, persistence and economic returns to overqualification," *Economics of Education Review.* Vol. 23. Statistics Canada Catalogue no. 11-015-XIE, 29-45. http://www.statcan.gc.ca/pub/11-015-x/edu/4070107-eng.htm	National Graduate Survey, 1982, 1986 and 1990.	The specific job requirement question used was: "When you were selected for that job, what level of education was needed to get the job?"
4.	Galarneau, Diane and René Morissette (2004), "Immigrants: Settling for less?" *Perspectives on Labour and Income* 5 (6), Autumn, Statistics Canada, Catalogue no. 75-001-XPE, 7-18. http://www.statcan.gc.ca/studies-etudes/75-001/archive/e-pdf/5018584-eng.pdf	Census of Population for 1991, 1996 and 2001.	Worker education levels are compared with the NOC code skill levels for the occupations they are working in
5.	Li, Chris, Ginette Gervais and Aurélie Duval (2006), "The Dynamics of Overqualification: Canada's Underemployed University Graduates," Statistics Canada Catalogue no. 11-621-MIE2006039. http://www.statcan.gc.ca/pub/11-621-m/11-621-m2006039-eng.pdf	Data from two separate panels of 30,000 adults surveyed for SLID. The first panel spanned six years from 1993 to 1998; the second panel spanned six years from 1996 to 2001. The sample was restricted to persons with at least a university degree, diploma or certificate at the beginning of the panel and who were never a manager throughout the entire panel.	An overqualified worker is defined as someone who held a university degree and worked between 1993 and 2001 in an occupation that required at most a high school education for at least one month. Worker education levels are compared with the NOC code skill levels for the occupations they are working in.
6.	Uppal, Sharanjit and Sébastien LaRochelle-Côté (2014b), "Overqualification among recent university graduates in Canada," Insights on Canadian Society, April, Statistics Canada, Catalogue no. 75-006-X. http://www.statcan.gc.ca/pub/75-006-x/2014001/article/11916-eng.htm	The 1991 and 2006 censuses of population are used, in addition to the 2011 National Household Survey.	Overqualification among university graduates is measured by calculating the proportion in occupations typically requiring a high school education or less. Worker education levels are compared with the NOC code skill levels for the occupations they are working in.

4444

4. Initiatives for Improving Student Learning

The empirical evidence shows that bachelor's graduates have been doing well in terms of employment and earnings outcomes. And yet, public funding support for universities in Canada and the US has weakened. Media reports persistently have focused on research results purportedly showing that large proportions of bachelor's graduates are overqualified for their jobs: findings we have argued are wrong.

What makes each new media report on this topic compelling to readers are the personal testimonials, incorporated into the media reports in the form of quotations from struggling recent bachelor's grads who were interviewed by the author or authors of the media report. We were not able to find interview quotes like that from, say, Princeton University or Harvard University or Stanford University bachelor's degree grads (though that does not mean that there are no such interview quotes). Our conjecture is that perhaps it is easier to find grads willing to say those sorts of things about the universities they recently graduated from if the engagement of those grads with those universities, while students, was low.

Christopher L. Eisgruber (2012), the President of Princeton University, argues that the variable most critical to learning is genuine faculty and student engagement.

Eisgruber explains what he means by engagement using results from a study conducted by Williams College. He reports that the results from that Williams College study show that the engagement variables found to make the biggest difference for students at that institution were:

- discussing career plans, intellectual topics, or course selection with a faculty member;
- interacting with a faculty member at a social event;
- working with a faculty member on a research project;
- papers or projects requiring the integration of material from multiple sources;
- conducting research from primary sources;

- making a formal in-class presentation; and
- participating actively in class discussions.

No national statistics agency or public opinion polling agency has been putting out statistics that break down recent university graduates by the universities they attended. However, we suspect that too little engagement to produce positive feelings and talk t parents and others about their university experiences is more a problem for students of larger public universities.

Already by the early 1990s, many universities had adopted teaching assignment practices that meant that faculty members viewed as engaged in promising research did not need to teach undergraduate courses, or only had to teach more advanced or honors undergraduate students. This left the masses of undergraduates at some large public universities with little or no contact with faculty members who are also actively engaged in research.[14] It may matter for the masses of undergraduates to have more contact with faculty members engaged in producing the joint product of research and teaching for those students to acquire a positive view toward the important of that joint sort of production that is the essence of why research universities matter for a nation.

Accepting this perspective leads to a different way of thinking about evolving options for using information technology (IT) in university undergraduate teaching.

4.1 Live lectures may yield more engagement in addition to enhanced memory

Experimental research shows that live professors can have value for memory of lecture content. Trish L. Varao-Sousa and Alan Kingstone (2015)[15] studied this issue, carefully controlling for all other factors that might vary between a live and online setting. After the lectures, students were tested on what they remembered. Memory performance was significantly

[14] American Association of University Professors (AAUP) (1992).
[15] Citation: Varao-Sousa TL, Kingstone A (2015) Memory for Lectures: How Lecture Format Impacts the Learning Experience. PLoS ONE 10(11): e0141587. doi:10.1371/journal.pone.0141587
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0141587
Editor: Andrew R. Dalby, University of Westminster, UNITED KINGDOM

higher in the Live session compared to the Video session. Additionally, students reported greater interest and motivation in the live lectures. Of course, in-class college education also creates social capital. Students learn how to debate and present themselves. Students also make friends and develop professional networks. Employers reportedly value social capital of these sorts.

The findings of Varao-Sousa and Kingstone (2015) suggest that making it easier for undergraduates to view lectures without attending classes will likely reduce learning, and that would almost surely also reduce engagement.

4.2 Helping professors know, and know about, their students

Experienced faculty members personally observe, on an ongoing basis, that many students try harder and pay better attention in a class when they feel that the faculty member recognizes them and cares about what happens to them. Unfortunately, it is hard for faculty members teaching large classes to even recognize individual students by name. They do not even hand back papers individually to students in sufficiently large classes, which is a step forward except for the fact that this removes one of the means by which faculty members used to learn to connect the names with the faces for at least some of the students in a large class. Thus, even though they may know the names of many of the students, they are unable to connect the names to the faces of those in their classes. It is hard for a student to feel that a faculty member cares about them when that faculty member cannot even use their name in calling on them in class.

Imagine a medical doctor conducting, or trying to conduct, patient check-ups, without the patient charts that doctors seeing patients always have handy. Faculty members need the counterpart of those medical charts that doctors have for each patient they see.

However, the two of the authors of this paper at the University of Alberta School of Business (Alice Nakamura and Phil Davidson) now give students in the classes we teach this option of filling out structured student bios with photos that can be looked at by the faculty members, but not other students. We do find that many (though not all) students are interested in

providing that bio information, and seem to appreciate that the faculty members involved were interested in having that information from them. The costs of adding this option for students were nothing beyond the creation of the software that lets the students input their bios.

Thinking to the future, it would not be a technologically hard extension of smart classroom facilities to have each seat in a classroom equipped with a sign-in panel. When a student takes a seat, they would enter their unique student codes, and then that student's name would appear on a screen diagram at the console for the classroom. Ideally, a faculty member could click on any of the names showing on that seat diagram for that class on that day. Students could then sit anywhere they pleased, one day to the next, and the faculty member teaching the class would still always have a seating plan in front of them showing the student names. Ideally, the faculty member would be able to click on any one of those entries and bring up a list of other selected information for a student, including the name they have indicted by which they prefer to be called in class and the list of questions missed on the last exam or quiz that class took.

4.3 Clicker benefits without students needing to have clickers

There is evidence that clickers can significantly improve student attention in large lecture classes. As others have also noted, many students enjoy using the devices and registering their own opinions. We also know from a variety of sorts of research that a change of pace can help students refocus attention on the substance of a lecture class, and clickers provide a change of pace in a manner that gets the students to think about the material being discussed.[16]

Moreover, a company called TOP HAT (Tophatmonocle Corp.) has now developed a classroom response system that lets students answer the questions posed using their own communications devices: computers, laptops, tablets, and smartphones. If an Internet connection is an issue, there is also an offline version of the system that can be used. [17] So faculty members can now enjoy the benefits that clickers brought their lecture classes without having to provide

[16] John Immerwahr (2009).
[17] https://tophat.com/

students with clickers or have them purchase clickers. Moreover, TOP HAT allows for automated grading, using the answers specified by the faculty member.

4.4 The option to give frequent in-class, instantly graded quizzes for credit

Recent research has demonstrated that the mere act of taking a quiz or a test also helps students to remember and retrieve information more efficiently.[18]

The TOWER (Texas Online World of Educational Research) online platform was developed to allow a faculty member to administer frequent in-class, very short, multiple-choice quizzes, that can be graded instantly, with the results for each individual student being made available right then and with the faculty member being able to see summary information for all the students and the lists of students who wrote perfect quizzes, and those who missed certain questions or more than a certain percentage of the questions.

An experimental evaluation of the TOWER approach yielded very favorable results, with the gains being especially impressive for students in demographic groups with poor outcome statistics at that university.[19] That study suggests multiple possible reasons for the positive results, including known impacts on memory of having to retrieve information multiple times. We note that this sort of quiz giving almost surely increased engagement for the students in multiple respects.

We see the TOWER approach as enhancing engagement. In contrast, some of the other ways in which faculty members and students sometimes use classrooms set up with projection equipment and WI-FI connectedness inevitably tend to lessen student engagement in lecture classes.

4.5 Convenient online ways for exams and assignments to be written or submitted in electronic form and conveniently managed by faculty members

[18] See Roediger et al. (2011) and Pennebaker et al. (2013), and references in those papers.
[19] Pennebaker et al. (2013)

Full blown exam questions and both short and longer written assignments develop student abilities to reason and communicate in ways that multiple choice and other short answer quiz and exam questions do not. However, the time and skills required for grading these sorts of evaluation exercises are prohibitive for large classes, especially given the challenges of reading the handwriting of many students. When faculty members use grading assistance, the supervision of the grading process is difficult when good answers can take a wide range of different forms. In a hard copy world, those doing the grading were not able to show answers they were wondering how to grade without setting those ones aside, and then bringing those in to the office of the faculty member (or sometimes calling on the phone) to ask for guidance.

However, sentences are vastly more compact and easier to read quickly. Moreover, a well-designed exam, term paper or assignment management system allows the faculty member to concatenate the files for all the students, if they wish, and also the adjust specifications like the font type and size to suit their reading preferences. And if they use grading assistance as well, both they and graders can conveniently view the same files at the same time without having to meet in person. Also, once the marking is completed, students can see their graded work as soon as the grading results are uploaded to the course management system.

4.6 Hiring strong undergraduate students as helpers for more junior students

Erhan Erkut and Armann Ingolfsson (2002) started the undergraduate student-helper supply chain that has become an important feature of the University of Alberta School of Business Bachelor of Commerce (BComm) program.

The top students in some of the large undergraduate quantitative methods courses at the University of Alberta School of Business are offered income earning opportunities helping other students: opportunities with rates of pay that rise with the level of responsibility. Some of these opportunities are managed in cooperation with student clubs.

At the end of each term, the faculty members who have been teaching the courses involved contact the students who did the best and authorize them to apply, if they wish, to be interviewed for a position for the coming term as an undergraduate teaching assistant (TA).

Each term also, the best TAs are invited to apply to become lab instructors. Using slides prepared by the faculty members teaching the course, and which are presented and discussed with all of the lab instructors and TAs at weekly training sessions for them run by those faculty members, the lab instructors deliver short lectures in the labs on computer applications and real data acquisition and management, putting to use the OM and statistics methods taught in the lectures. While they are doing this, a small army of undergraduate TAs walks up and down the rows, looking at what students are doing on their screens, and stopping to help those having trouble.

Intellectual engagement includes student-faculty interactions, student engagement with assigned and other reading material, student writing and research activities, and student-student intellectual interactions including helping other students learn.

Undergraduate level statistics proficiency is far more job-relevant value when coupled with proficiency using modern spread sheet software programs (e.g., Microsoft Excel) and knowledge of subject area specific relevant datasets and data sources. Also, spreadsheet proficiency is a skill many employers value for wide ranging job categories because so many businesses and other organizations now both maintain much of their operational data in spreadsheet formats, and also make government and other required submissions using spreadsheets. It turns out, moreover, that the basics of statistical reasoning are far easier to teach to students when they can do data manipulations themselves using spreadsheets.

Thus students in the introductory business statistics course at the University of Alberta School of Business are helped through the specifics of downloading large datasets from Statistics Canada, from the US Bureau of Labor Statistics, from financial data sources such as Compustat, and from data sources for other nations besides Canada the US from sources such as the World

Bank and OECD (Organization of Economic Cooperation and Development) data websites beginning in the very first week of the course. They are also helped, one week to the next, to acquire the Excel skills that enable them to work with large size, real administrative, marketing and other sorts of datasets now commonly utilized by businesses of all sizes.

We have noticed a very positive change in student engagement once we encourage them to do even a very small exercise or project for which they are using their own data.

Also, at the University of Alberta School of Business, a tutoring program was established by the Operations Management (OM) Club to help other students. At the end of each term, the faculty members teaching the main quantitative methods courses send an email message to each of the students who have done well enough that the faculty member feels they would be qualified to help other students with that course in the next and following terms while they are still in the program. Students who received this invitation and are interested use the code they are each sent to register with the software system that enables tutors to specify when they are available to provide tutoring, and that lets students looking for a tutor book one of the available openings. Scheduling of tutoring sessions was originally done by the Vice President Academic for the OM Club. However, as the tutoring program grew in size and began to be used also by large business statistics and introductory finance courses, the session scheduling task became a heavy burden. Hence an online, self-service scheduling system was created, and have been used successfully now for three years.

Faculty members also upload to a tutor materials file the current course outline, and any other materials the tutors might need for helping the students who book sessions with them. The minimum amount of time a student can book a tutor for (1 hour) and the price per hour for this tutoring ($20 per hour right now) are both set by the OM Club. This OM Club tutoring program

has been operating since 2011. By now, the University of Alberta Finance Club has also begun offering tutoring using the same online system.[20]

When strong students tutor more junior students, in addition to helping their more junior colleagues learn, these interactions help the more junior students get to know those ahead of them in the program. This promotes more knowledge about course options, and about what happens when the students nearing graduation begin trying to get job interviews, and then begin the process of going to interviews.

4.7 Actively helping strong students with commendable post-graduation plans to take extra classes they need to realize those plans (preferably without charging them more)

An especially regrettable reality is that the percentage of first-year college students who need to take remedial classes is very high at around 35 percent. Moreover, a substantial percent of first-time, full-time students who enroll in a bachelor's degree program do not graduate within 6 years. All of the measures already discussed in this section can potentially help with this problem. [21]

McKinsey & Company recommends that universities adopt more direct administrative controls over classes that students take that do not contribute to the success of the university in having favorable graduation rate metrics. They note the following causes of these "unproductive" class hours that students take:

(1) failed or withdrawn classes, noncredit classes,

(2) transfer credits that are not accepted toward a degree, or

(3) credits taken that are above those required.

It is stated in the McKinsey study that, from a systems perspective, ultimately, the above three factors contribute on an equal footing to increasing the cost per degree completed. By now,

[20] A demonstration page for the system can be seen at . Faculty members at other universities in Canada are also welcome to set up a similar tutoring program for their own students. There is no charge for use of the self severice tutor appointment booking system. Any faculty member in Canada who wants to do that will find directions at....
[21] US Department of Education (2013)

we know first-hand of two large universities where administrative systems have been instituted in at least some of the faculties governing the courses that undergraduates can take that limit all three of those causes of unfavorable completion efficiency metric values.

However, whereas the administrative measures that reduce credit hours associated with factors (1) and (2) mostly impact weaker students, the opposite is true for factor (3). Measures to reign in that factor can result in star students not being allowed to take extra courses needed, say, for gaining entrance to graduate level programs they were seeking to qualify for.

If the objective of increasing undergraduate engagement were accepted, it is only the first two of the above list of factors that would be constrained administratively. In contrast, the student who have discovered they need certain specific sorts of courses to get onto the ladders for their own career goals would be helped to find ways of getting into those courses, even if that means being allowed to take a few courses more than what is required for their degree. This way, they would see the university faculty members as actively helping them achieve their career goals rather than being part of the barriers to so-doing. It is a common experience for a third year university student to discover they need courses that are not required for to graduate with their degrees, but that are entrance requirements for the sorts of jobs or for the additional education programs those students have discovered by that point that they need.

5555

5. Adding For-Credit, Career Planning Study Groups

The media reports deploring the plight of bachelor's graduates have a by-now-standard format. They combine the supposed bottom-line findings from research reports from government and other experts with quotes from others implied to be in positions to be knowledgeable about the real life experiences of employers with what is happening to university graduates and quotes from bachelor's degree graduates who have not managed to find the sorts of jobs they had been hoping to find. For example, a Maclean's article[22] reports on a young man who graduated from the University of Toronto with a bachelor's degree in political science and philosophy. In the article, it is stated that this young man searched job boards in the finding an entry-level civil service job such as a junior policy analyst or a position in a passport office, but that experience in the field was wanted for all the openings he found that were of interest to him.

The fact that employers put so much information online now that is freely accessible by Internet opens up new possibilities for Departments and programs within universities that are interested in helping students understand what careers can look like for people with qualifications in their area, or who are interested in helping their majors prepare for the school-to-work transition.

When employers put their job ads on commercial job sites, they have choices concerning how much they pay for the ads. Often employers will not be willing to pay more for the jobs they are advertising that require no experience. One consequence of this is that those job ads are harder for job seekers to find, and in our experience often inexperienced job seekers fail to find them.

However, various commercial jobsites are not set up to put the needs of jobseekers first for the simple reason that job seekers pay nothing for using the sites; rather, it is the employers

[22] Chris Sorensen (2014)

who pay. The jobsites benefit most from jobseekers clicking on the job ads for which employers pay most, and those are most commonly job ads for positions for which an employer wants to attract scarcer sorts of applicants, such as those who already have substantial work experience. When new jobseekers keep opening up job ads for which years of work experience are required, this is discouraging for them.

Most people need some instruction and some practice to be able to effectively find the job ads that are right for them on online job sites. At many universities it is assumed that the campus careers office will give students what they need in this regard. However, those offices often provide little information about the various online job boards. Some fail to provide the information to students because they are dependent on the revenue earned from the fees they charge employers to post their job ads on the online job board that the campus career office operates. Some of those claim that it is better for students to focus on using the online job board that the campus career office runs. They are surely right that students should always begin their search by checking what it on the campus career office site. Any employer who put a job ad there is likely especially interested in hiring a students or grad of that university. However, when the campus career office is charging $100 or more per job posting an employer puts onto their site, many employers do not put all, or sometimes any, of the job ads they have onto the campus career office site. Instead they use a site with no charges, or a site that charges by the click once an ads is posted rather than charging up front having the job ad on their site.

It would help many students if they were required to create an online statement about their own career plans when they first start taking courses at a university. For a beginning student, that statement could include the sort of job they hope to hold 10 years after they graduate, and then electronic copies of the job ads they could find in one hour each week spent searching online job sites. Students could be given a list of the sites they were required to check in their online searches. They could then be required to make a monthly report on the job ads they had

found for that 10-year-out sort of job, with the focus of that report being the qualifications the ads they have found state are needed to apply for the job openings.

Often the job ads for more senior positions will not only state that experience is required, but will also say something about the sort of jobs that experience must be for. Then in subsequent months, the students can be asked to work their way backwards, down the job ladder leading to positions like their 10-year-out career goal, with the students copying into their career folders the sorts of ads they could find for each step down the ladder leading to their 10-year-out career goal job. Their monthly report would concentrate on the work experience, and also the education and any other certifications required for job openings at that rung of the job ladder for their own 10-year-out career goal. Instruction in how to search for this information could be provided in the form of reading material supplemented by an online video that a student could watch at the times of their own choosing. Unlike subject matter courses such as writing or history or statistics where many students seem to need the encouragement of a live professor to stay motivated to do the assigned studying and to pay attention in lectures, students typically tend to be interested from the start in looking at real job ads, making an online teaching format be one that can work for this area of their instruction.

Thus, we are recommending the addition of a 1-hour a week, for-credit job search seminar to the programs of bachelor's level undergraduates in all areas. Students in the first two years of their studies would not be asked or pushed in any way to make their course selections align with their stated 10-year-out career goals. However, at the end of year 2 of their bachelor's programs, they could be asked to submit a statement of how their course selections fit with their career goals. Students working on that report could be provided with reading materials and statistical evidence about the fact that a huge range of different sorts of undergraduate major areas of studies can help them get onto a job ladder for their 10-year-out career goal sort of job, but that it will be important for them to notice specific sorts of skills, and also any other education requirements, that are required for that job ladder.

A 1-hour per week job search seminar could help more students be aware of the importance of availing themselves of the co-operative education and summer job and intern type work experiences that many universities have invested heavily in offering their students. This sort of a seminar could also help them develop more realistic expectations about how a 4-year bachelor's degree does, and does not, prepare a student for the world of work. For instance, they can be given evidence about the more general sorts of career paths that are followed by many of those with degrees in areas that help them develop good reading and communications skills, as compared with the careers open to those who go on to get a Masters or PhD level of training in those areas. It is true that many employers no longer accept or provide on-the-job training as a way of working into more senior positons for which specialized sorts of knowledge are needed.

Cooperative Education programs are one of the main ways in which universities seek to try to help their students deal with the fact that, for an undergraduate to land a job the uses specialized sorts of knowledge from their major area of study typically requires gaining work experience. Originally, it was mostly undergraduate engineering faculties that offered cooperative education programs to their students.[23] Now, however, these programs are widely available as well to Arts and Science Faculty students. [24]

Some universities have been experimenting too with training sorts of work experience that go beyond what cooperative education positions normally involve in terms of the arrangements to create on-the-job learning. For example, the University of Alberta School of Business tries to deal with this reality in the finance area, for instance, with a special program called PRIME that many of the the best of the best finance majors who are interested in going into industry jobs directly following completion of their bachelor's degrees prepare to try to enter, with stiff competition for the small number of spots the PRIME program has to offer.[25]

---

[23] http://www.bu.edu/eng/careers/jobs/coop/
[24] http://www.utsc.utoronto.ca/askcoop/arts-science-co-op-programs , http://www.science.mcmaster.ca/scce/
[25] https://www.ualberta.ca/business/student-organizations/prime

PRIME is a student-run investment program that manages a fund worth over C$1,700,000. PRIME was established to provide University of Alberta School of Business students with investment experience in an institutional setting. The program is a high quality practicum that combines traditional academic objectives with that of hands-on investment analysis and portfolio management. Those admitted to the program are a select group of Bachelor of Commerce students who go through a competitive screening process for admission into the two year PRIME program. Education and nursing faculties have, all along, of course, provided their students with practicum experience.[26]

If those writing articles for media outlets about the plight of recent bachelor's grads, the question list for young person they quote as not being able to find a job of the sort they had thought they could get should be asked if they opted to take the cooperative education option while they were a student, or went to the effort to seek out summer jobs after their second and third years of study that were with an employer of the sort they were hoping to work for after graduating.

We believe that universities might usefully do more to help students become more aware of why they should take a co-operative education term or two, why their summer work choices matter for more than just earning money to pay their tuition and living expense bills, and alternative ways in which they can build experiences that will help them get onto the job ladders for the careers they hope to have 10-years-out after graduating with their bachelor's degrees. Students who come from families with one or more parents who have been to university themselves often have some understanding of the sorts of job ladders that exist for different sorts of more senior jobs. However, students coming from homes where neither of their parents have a university education often have little knowledge of the nature of job ladders for the jobs that more education workers have a chance of having over time.

[26] Beck and Kosnik (2002), Casey et al. (2011)

666

6. Support for National Information Collection on Career Paths

There are ongoing efforts in the US to develop better data resources regarding publicly subsidized education services and the school to work transition. In the US, most states have by now created government entities with responsibility for collecting and using **student unit record (SUR)** data. The agency within a state charged with responsibility for the postsecondary student unit record system is now often referred to as a PSURS.[27]

PSURSs are the primary mechanisms for generating state postsecondary metrics.[28]

However, only a small minority of agencies indicate currently having access to two additional data elements not commonly collected by unemployment insurance systems that hold the potential to significantly improve outcomes analyses. In particular, the PSURs in either states indicated they had access to number of hours worked. Data of this sort can potentially allow researchers to differentiate, for example, between highly paid part-time workers and poorly paid full-time workers.

Five respondents reported access to Standard Occupational Classification (SOC) codes. These codes make it possible to analyze employment within fields.

Data matches between PSURSs and workforce data systems are widely used to assess employment outcomes of postsecondary graduates. Thirty-two agencies use their PSURS matches for this purpose, and half of those are mandated by law to do so.

.

Perhaps it might make sense for large public universities in both Canada and the US to consider offering students a reduction of, say, a few hundred dollars in their tuition when they first enroll as a student in return for the student signing a legal agreement giving permission for their student performance data for any and all courses they might take from that institution to be

[27] John Armstrong and Christina Whitfield (2016)
[28] John Armstrong and Christina Whitfield (2016)

included in the state PSUR, and linked to their tax return and Social Security and other government administrative records as well as to their responses on official statistics surveys for the rest of their lives. We believe that a substantial number of students at universities in both countries would be willing for their university course choices and outcomes data to be connected to other data collected from them and used to help them and others better know what sorts of education choices do, and do not, work well in terms of subsequent outcomes.

7777

7. Important Cyber Security Issues

In this paper, we have suggested multiple ways of using IT to achieve more and better engagement of students. All these ways do rely on a university having reliable on-campus computing and data storage and Internet access including email.

The University of Calgary in Canada was recently featured in a news article in the high impact factor journal Nature, but not in a way in which that university would like to be featured. The *Nature* article is about a hacker attack on that university.[29] The attack started on 28 May. One of the researchers at the University of Calgary describes how he discovered an attack was in progress. Patrick Feng[30] reportedly went to check his Dropbox folder and discovered that hackers had created encrypted copies of all his Dropbox files, deleted the originals, and left a ransom note demanding bitcoin to unlock the files. Bitcoin is an online, anonymous currency, making it an attractive option for cybercriminals. The University of Calgary has now publicly disclosed that the school paid a ransom of Can$20,000 for the decryption keys.

This is not the first time the University of Calgary has had a cybersecurity problem.[31] One fact not in any of those press reports is that students in faculties at other Canadian universities also depend on the IT services at the University of Calgary to access the Blackboard classroom support system services used in the classes they are taking, including for exams.[32] Third party commercial IT providers have their own reasons for extolling the benefits to universities of connecting all their various IT systems, making those compatible with the systems at other universities, and centralizing control and maintenance of the systems. However, whereas these measures make the systems cheaper and easier for a third party provider to sell, service and

[29] Brian Owens (2016)
[30] https://commfilm.ucalgary.ca/manageprofile/profiles/patrick-feng
[31] Todd Mackey (2016).
[32] https://eacct-calgary-sp.blackboard.com/eAccounts/AnonymousHome.aspx

develop to the largest possible customer base, these measures leave universities more vulnerable in multiple ways to cyberattacks.

American readers might be thinking that their powerful universities are successfully avoiding or defending themselves against cyberattacks, but this is not the case.

For example, Rutgers has suffered a whole series of cyberattacks. Rutgers is the eighth-oldest of the US universities. The current name of the institution dates back to 1825 in honor of a philanthropist whose donation rescued the school then from years of financial difficulties.[33] As New Jersey's premier state university, Rutgers' budget for 2015 was US $3.78 billion.

For the year of 2015, the combined enrollment for all Rutgers campuses was 54,822 full-time students and 12,734 part-time students, for a total of 67,556, with 48,096 of those being undergraduate students. The undergraduate student body in 2015 included 5,133 students listed as out-of-state residents. Of the 19,460 graduate students in 2015, 6,040 were out-of-state residents. [34]

Starting in November of 2014, Rutgers has experienced a whole series of increasingly brazen Distributed Denial of Service (DDoS) attacks, with escalating bad impacts on students since the outages affected Sakai and eCollege, two online systems used to administer homework, tests and other communication, according to student complaints on social media. A DDoS attack is an attempt to make an online service unavailable by overwhelming it with traffic from multiple sources.[35] The hacker claimed he or she was being paid $500 an hour in bitcoin by someone with a grudge against the school.[36] Soon the FBI was called in to try to find the source of the attacks. Rutgers also announced the decision to spend between $2 million and $3 million on information security measures and soon hired three of America's best known cyber security firms. Yet the attacks continued.[37] Forensic work reveals that 40,000 bots originating primarily

[33] Stoeckel (1976).
[34] Rutgers (2016).
[35] https://en.wikipedia.org/wiki/Denial-of-service_attack
[36] Elliot Maras (2015)
[37] Linda Musthaler (2015)

from Eastern Europe and China were used to flood the university's network with service requests in November's attack. Pending the FBI's ongoing investigation, it is unclear at this point whether the three incidents are connected.[38]

Rutgers has been an attractive target for cyber extortion attempts partly because the university is not only very large, but has been a leader in using IT to better serve student needs and in connecting and centralizing control of the various IT systems that have been in use at the university. In contrast, the best defense against cyberattacks is to limit internal connectedness of IT services, to the extent that this is an option. This is a reality pointing in the opposite direction of centralizing the various IT systems of a university.

By keeping different IT activities and systems largely separate, the potential for an attack to cause wide disruption is greatly reduced, and along this reduction tends to be a reduction in the interest of potential attackers from conducting an attack. They will recognize that extracting a large ransom is not so likely if the damage that can be inflicted is quite limited rather than taking down an entire suite of services.[39]

Third-party providers of IT services for universities often push aggressively for consolidation and interconnectedness of a university's IT systems. We are aware of multiple situations like the following case where interconnectedness and consolidation of provision of different sorts of service on a university, or for multiple universities, has lowered the costs of the third-party IT service providers, in the short-run at least, but has left those universities more vulnerable to cyberattacks.

In Department X, a group of tenured faculty members gave up time they otherwise would have spent on their own research project to the software to enable their students to take and submit exams on computers. They used the software developed successfully over some number of years. However, the university IT group subsequently pushed for, and got approval, to have all

[38] David Bisson (2015)
[39] Rodney Caudle (2015)

IT services placed under their control. That group then subsequently made contractual arrangements with external companies providing course support software systems: contracts that contained no provisions to protect the functionality or build bridges to special purpose software systems the faculty members had created and were using for their classes. The faculty members built the needed bridges so they could go on using their special purpose software systems. However, the external providers periodically made systems upgrades to the core functions they had become responsible for, giving no warning to the faculty members connecting to those services. When the faculty members sought remedies for this situation, they soon found that the external providers were entitled, under the contracts executed, to just deal with the IT group management, and that they were only obligated to deal with them concerning deficiencies in the contracted services, as spelled out in the signed contracts.

As the role of third-party IT providers increases, the place of university's own IT group often is weakened. For example, Alex Barrett (2014) gives the example of the data center at the University of Maryland's Robert H. Smith School of Business, which he describes as having become "somewhat of a ghost town."

888

8. In Conclusion

In a July 6, 2016 article published by Robert Matz (2016) argues that the news articles about overqualified university graduates are untrue in many of their specifics and implications, and are undermining the career development efforts of young people. Similarly, in an August 2016 Globe and Mail, Barrie McKenna (2016) argues that it is **"**time to retire the myth of the educated barista." He argues that this rhetoric is sending wrong messages to young people. This paper supports the views of Matz and McKenna that the literature on overqualified workers in not well founded. We also suggest initiatives the university community might take to try to deal with the public attitudes toward research universities that the overqualified literature has encouraged the growth of, and that are endangering the funding basis for institutions that, in our view, have an important role to play for democracies like Canada and the US. In our view, the joint product of teaching and research that is the essence of research universities cannot be produced by many of the alternatives now being considered in public discussions of the costs of a university education. For instance, if the cost is brought down,

RRRR

Bibliography

Abel, Jaison R., Richard Deitz, and Yaqin Su (2014), "Are Recent College Graduates Finding Good Jobs?" *Current Issues in Economics and Finance*, 2014, 20 (1). https://www.newyorkfed.org/medialibrary/media/research/current_issues/ci20-1.pdf

Allen, Robert C. (1999), Education and Technological Revolutions: The Role of the Social Sciences and the Humanities in the Knowledge Based Economy. http://contentdm.ucalgary.ca/cdm/ref/collection/ucpub/id/62217

American Association of University Professors (AAUP) (1992), "On the Status of Non-Tenure-Track Faculty," Academe 78 (6) Nov.-Dec., pp. 39-48. https://www.aaup.org/report/status-non-tenure-track-faculty

Armstrong, John and Christina Whitfield (2016), "The State Of State Postsecondary Data Systems," State Higher Education Executive Officers Association (SHEEO). http://www.sheeo.org/sites/default/files/publications/SHEEO_StrongFoundations2016_FINAL.pdf

Auguste, Byron G., Adam Cota, Kartik Jayaram and Martha C. A. Laboissière (2010), "Winning by degrees: the strategies of highly productive higher-education institutions," McKinsey & Company. http://www.aascu.org/corporatepartnership/McKinseyReport.pdf

Barrett, Alex (2014), "Modern Infrastructure: As SaaS outsourcing takes away data center tasks," what's left for IT teams? February 2014, Volume 3, Issue 2. http://searchitoperations.techtarget.com/ezine/Modern-Infrastructure/As-SaaS-outsourcing-takes-away-data-center-tasks-whats-left-for-IT-teams

Battu, H. C.R. Belfield and P.J. Sloane (2000), "How Well Can We Measure Graduate Over- Education and Its Effects?" National Institute Economic Review January 2000 vol. 171 no. 1 82-93. Earlier 1997 version available at ftp://lists.repec.org/RePEc/wuk/abdnwp/Grad4.PDF

Beck, Clive and Clare Kosnik (2002), "Professors and the Practicum: Involvement of University Faculty in Preservice Practicum Supervision," Journal of Teacher Education 53 (1), 6-19. http://jte.sagepub.com/content/53/1/6.abstract

Beaudry, Paul, David A. Green and Benjamin M. Sand (2016), "The Great Reversal in the Demand for Skill and Cognitive Tasks," Journal of Labor Economics 34 (S1, Part 2) January, S199-S247. http://www.journals.uchicago.edu/doi/abs/10.1086/682347

Bisson, David (2015), "FBI Assists Rutgers University Investigate Second DoS Attack in a Month." http://www.tripwire.com/state-of-security/latest-security-news/fbi-assists-rutgers-university-investigate-second-dos-attack-in-a-month/

Boudarbat, Brahim, Thomas Lemieux, and W. Craig Riddell (2010) "The Evolution of the Returns to Human Capital in Canada, 1980–2005," Canadian Public Policy 36 (1), 63-89. http://www.utpjournals.press/doi/abs/10.3138/cpp.36.1.63

Casey, Kathy, Regina Fink, Cathy Jaynes, Linda Campbell, Paul Cook and Vicki Wilson (2011), Journal of Nursing Education 50 (11), 646-652.

Caudle, Rodney (2015), "**Recommendations for Defending Against Application-Layer DDoS Attacks**," IT NEWS AFRICA. http://www.itnewsafrica.com/2015/10/ddos-attacks-often-coincide-with-other-threats

Cram, Jack (1973), Review of *CANADIAN CLASSIFICATION AND DICTIONARY OF OCCUPATIONS 1971, VOLUME I: CLASSIFICATIONS AND DEFINITIONS*, *Canadian Counsellor* 7 (1) JANUARY, 70.

Crompton, Susan (2002), "I still feel overqualified for my job," *Canadian Social Trends*, No. 67, Winter 2002, Statistics Canada, Catalogue no. 11-008-X, 23-26. http://www.statcan.gc.ca/pub/11-008-x/2002003/article/6397-eng.pdf

Davenport, Paul (2001), Universities and the Knowledge Economy, *Ivey Business Journal*, REPRINT# 9B01TC13. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjz-aG_6bjJAhXJmogKHc7yD88QFggcMAA&url=http%3A%2F%2Fdonorth.co%2Fappurtenancy%2Fpdfs%2Fdavenport_knowledge_economy.pdf&usg=AFQjCNHeBGAJZisntGNLASB4GdzAEj848Q&sig2=xEwmWe6-TDJu8rkdodDJGw&bvm=bv.108194040,d.cGU

Dougherty, Kevin J., Sosanya M. Jones, Hana Lahr, Rebecca S. Natow, Lara Pheatt and Vikash Reddy (2014), "Implementing Performance Funding in Three Leading States: Instruments, Outcomes, Obstacles, and Unintended Impacts," Community Ciollege Research Center (CCRC), CCRC Working Paper No. 74, Teachers College, Columbia University. http://ccrc.tc.columbia.edu/publications/implementing-performance-funding-three-leading-states.html

Drew, Jennifer C., Monika W. Oli, Kelly C. Rice, Alexandria N. Ardissone, Sebastian Galindo-Gonzalez, Pablo R. Sacasa, Heather J. Belmont, Allen F. Wysocki, Mark Rieger and Eric W. Triplett (2015), "Development of a Distance Education Program by a Land-Grant University Augments the 2-Year to 4-Year STEM Pipeline and Increases Diversity in STEM," PLOS ONE 10(4): e0119548. doi:10.1371/journal.pone.0119548. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0119548

Eisgruber, Christopher L. (2012), "Remarks to presidents of the American Association of Universities (AAU)," prepared for delivery at the AAU meeting on Oct. 23, 2012, Office of the President, Princeton University. http://www.princeton.edu/president/eisgruber/speeches-writings/archive/?id=10613

Erkut, Erhan and Armann Ingolfsson (2001), "Online Exams Put to the Test Despite some technical obstacles, concept computes for introductory management science course," OR MS TODAY 28 (4) August, 26-29. http://www.orms-today.org/orms-8-01/erkutfr.html

Erkut, Erhan and Armann Ingolfsson (2002), "Managing the Student Supply Chain," OR/MS Today, August 2002. http://www.orms-today.org/orms-8-02/frerkut.html

Ferguson, Sarah Jane and John Zhao (2013), "Education in Canada: Attainment, Field of Study and Location of Study," National Household Survey, 2011, Statistics Canada, Catalogue no. 99-012-X2011001. http://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-012-x/99-012-x2011001-eng.cfm

Ferreras, Jesse (2014), "This Is How Many Arts Grads Are Overqualified for Their Jobs," Huffington Post. http://www.huffingtonpost.ca/2014/04/03/arts-degree-overqualified-statistics-canada_n_5087385.html

Finnie, Ross (1998), "Changes in the Structure of Postsecondary Graduates' Earnings in the 1980s and 1990s." Ottawa: Human Resources Development Canada, Applied Research Branch.

Finnie, Ross (1999), "Post-secondary graduates: Holding their own in terms of employment rates and earnings patterns." Canadian Business Economics 7, no. 4 (December 1999): 48-64.

Finnie, Ross (2000), "Holding Their Own: Employment and earnings of postsecondary graduates," *Quarterly Review* 7 (1), Statistics Canada – Catalogue no. 81-003, 21-37. http://www.statcan.gc.ca/studies-etudes/81-003/feature-caracteristique/5018894-eng.pdf

Freeman, Richard B. (1976), *The Overeducated American*, Academic Press. https://www.amazon.com/Overeducated-American-Richard-B-Freeman/dp/012267250X

Frenette, Marc (2000), "Overqualified? Recent graduates and the needs of their employers," *Education Quaterly Review* 7 (1), Statistics Canada Catalogue no. 81-003-XIE. 6-20. http://www.statcan.gc.ca/pub/81-003-x/81-003-x2000001-eng.pdf

Frenette, Marc (2004a), "The overqualified Canadian graduate: The role of academic program in the incidence, persistence and economic returns to overqualification," *Economics of Education Review*. Vol. 23. Statistics Canada Catalogue no. 11-015-XIE, 29-45. http://www.statcan.gc.ca/pub/11-015-x/edu/4070107-eng.htm

Frenette, Marc (2004b), "The overqualified Canadian graduate: The role of academic program in the incidence, persistence and economic returns to overqualification," *Economics of Education Review*. Vol. 23. Statistics Canada Catalogue no. 11-015-XIE, 29-45. http://www.statcan.gc.ca/pub/11-015-x/edu/4070107-eng.htm

Galarneau, Diane and René Morissette (2004), "Immigrants: Settling for less?" *Perspectives on Labour and Income* 5 (6), Autumn, Statistics Canada, Catalogue no. 75-001-XPE, 7-18. http://www.statcan.gc.ca/studies-etudes/75-001/archive/e-pdf/5018584-eng.pdf

Garfield, Joan (2002), "The Challenge of Developing Statistical Reasoning," *Journal of Statistics Education* 10 (3). http://www.amstat.org/publications/jse/v10n3/garfield.html

Gilmore, Jason. 2009. *The 2008 Canadian Immigrant Labour Market: Analysis of Quality of Employment*. The Immigrant Labour Force Analysis Series. No. 5. Statistics Canada Catalogue no. 71-606-X.

Gönül, Füsun F. and Roger A. Solano (2013), "Innovative Teaching: An Empirical Study of Computer-Aided Instruction in Quantitative Business Courses," Journal of Statistics Education 21 (1), 1-13. http://www.amstat.org/publications/jse/v21n1/gonul.pdf

Government of Canada (2001), Introduction to Edition 2001 of the National Occupational Classification (NOC). http://www30.hrsdc.gc.ca/NOC/english/NOC/2006/Introduction.aspx

Government of Canada (2011), Tutorial NOC 2011. http://www5.hrsdc.gc.ca/NOC/English/NOC/2011/Tutorial.aspx

Hagedorn, Marcus and Iourii Manovskii. 2013. "Job Selection and Wages over the Business Cycle." American Economic Review 103 (2):771–803.

Huhman, Heather R. (2012), "The Future of Education: How 2tor Is Helping America's Great Universities Go Online," Business Insider, April 11, 2012. http://www.businessinsider.com/the-future-of-education-how-2tor-is-helping-americas-great-universities-go-online-2012-4

Immerwahr, John (2009), "Engaging the "thumb generation" with clickers," *Teaching Philosophy*, 32 (3), 233-245. http://www46.homepage.villanova.edu/john.immerwahr/TP101/clicker%20articleTP.pdf

Kambourov, Gueorgui and Iourri Manovskii. 2009. "Occupational specificity of human capital." International Economic Review 50:63–115.

Li, Chris, Ginette Gervais and Aurélie Duval (2006), "The Dynamics of Overqualification: Canada's Underemployed University Graduates," Statistics Canada Catalogue no. 11-621-MIE2006039. http://www.statcan.gc.ca/pub/11-621-m/11-621-m2006039-eng.pdf

Mackey, Todd (2016), "The University of Calgary Under Siege," Mitnick In The News, June 13, 2016. https://www.mitnicksecurity.com/S=0/site/news_item/the-university-of-calgary-under-siege

Maidment D.W., H. Kang, E.C. Gill, and S. Amitay (2015) Acquisition versus Consolidation of Auditory Perceptual Learning Using Mixed-Training Regimens. PLoS ONE 10(3): e0121953. doi:10.1371/journal.pone.0121953

Maras, Elliot (2015), "Hacker Paralyzes Rutgers University With DDoS Attacks; Mocks Its Cybersecurity Efforts," HACKED. https://hacked.com/hacker-paralyzes-rutgers-university-ddos-attacks-mocks-cybersecurity-efforts/

Matz, Robert (2016), "The Myth of the English Major Barista," July 6, 2016. INSIDE HIGHER ED. https://www.insidehighered.com/views/2016/07/06/cultural-implications-myth-english-majors-end-working-permanently-starbucks-essay

McKenna, Barrie (2016), "time to retire the myth of the educated barista." Globe and Mail, August 1, 2016, pp. B1 and B3.

Mojtahedi, Negar (2014), "StatsCan: One third of young Canadians with arts degrees overqualified for their jobs," Global News. http://globalnews.ca/news/1247651/statscan-one-third-of-young-canadians-with-arts-degrees-overqualified-for-jobs/

Musthaler, Linda (2015), "Rutgers University gets an F for its failure to prevent repeated DDoS attacks," corero. https://www.corero.com/blog/676-rutgers-university-gets-an-f-for-its-failure-to-prevent-repeated-ddos-attacks.html

Nakamura, Alice O., Masao Nakamura and Dallas Cullen (1979), "Job Opportunities, the Offered Wage and the Labor Supply of Married Women," *American Economic Review*, Vol. 69, 787-805.

Nakamura, Masao and Alice O. Nakamura (1981), "A Comparison of the Labor Force Behavior of Married Women in the United States and Canada, with Special Attention to the Impact of Income Taxes," *Econometrica*, Vol. 49, 451-489.

Nakamura, Alice O. and Masao Nakamura (1989), "New Measures of Non-wage Compensation Components: Are They Needed?" Survey of Current Business, Vol. 69, 58 61.

Nakamura, Alice O. (1998), "Re-thinking Our National Back-to-School Rhetoric" (with A. Nakamura), Policy Options, Vol. 19 (2).

Nakamura, Alice O. and Joel Bruneau (2002), "The Global Talent Hunt and the Growth of e-Recruiting in Canada," in David Laidler (ed.), *Renovating the Ivory Tower*, C.D. Howe Institute, pp. 80-104.

Nakamura, Alice O., Kathryn L. Shaw, Richard B. Freeman, Emi Nakamura, Amanda Pyman (2009), "Jobs Online," chapter 1 in David H. Autor (ed.), Studies of Labor Market Intermediation, University of Chicago Press, pp. 27-65. http://www.nber.org/chapters/c3590.pdf

Natow, R. S., Pheatt, L., Dougherty, K. J., Jones, S., Lahr, H., & Reddy, V. (2014), "Institutional changes to organizational policies, practices, and programs following the adoption of state-level performance funding policies," CCRC Working Paper No. 76. http://ccrc.tc.columbia.edu/publications/institutional-changes-following-performance-funding-policies.html

Owens, Brian (2016), "'Ransomware' cyberattack highlights vulnerability of universities," Nature August, 2016, doi:10.1038/nature.2016.20111. http://www.nature.com/news/ransomware-cyberattack-highlights-vulnerability-of-universities-1.20111

Parliamentary Budget Officer (PBO) (2015), *Labour Market Assessment 2015*, 12 November 2015, pp. 14-26. http://www.pbo-dpb.gc.ca/web/default/files/Documents/Reports/2015/Labour%202015/Labour_Market_Assessment_2015_EN.pdf

Pennebaker, James W., Samuel D. Gosling, Jason D. Ferrell (2013), "Daily Online Testing in Large Classes: Boosting College Performance while Reducing Achievement Gaps," *PLOS ONE* 10.1371/journal.pone.0079774. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0079774

Picot, Garnett, Andrew Heisz and Alice Nakamura (2000), "Were 1990s Labour Markets Really Different?" Policy Options, Vol. 21 (6), 15-26.

Quinton, Sophie (2015), "States To Colleges: Prove You're Worth It," Stateline. http://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2015/07/28/states-to-colleges-prove-youre-worth-it

Raphel, Alexandra (2014), "Are recent college graduates finding good jobs?" *Journalist's Resource*, January 24, 2014. http://journalistsresource.org/studies/economics/jobs/recent-college-graduates-employment-underemployment

Rendon, Paul-Mark (1999), "Job opportunities only a click away," The Gazette 92, (80), February 18, 1999. http://www.usc.uwo.ca/gazette/1999/February/18/News5.htm

Roediger III HL, Putnam AL, Smith MA (2011) The benefits of testing and their applications to educational practice. Psych of Learning & Motiv 55: 1–36. DOI 10.1016/B978-0-12-387691-1.00001-6.

Rumberger, Russell W. (1987), "The impact of surplus schooling on productivity and earnings," Journal of Human Resources 22 (1) Winter, 24-50.

Rutgers (2016), Rutgers Budget Facts and Figures, State of New Jersey. http://budgetfacts.rutgers.edu/

Sicherman, Nachum (1991), "Overeducation in the labor market," Journal of Labor Economics 9 (2) April, 101-122.

Smith, James P.; Welch, Finis (1978), "The Overeducated American? A Review Article," RAND Paper. http://www.rand.org/pubs/papers/P6253.html

Sorensen, Chris (2014), "The myths about Canada's skills gap," Maclean's, September 30, 2014 edition. http://www.macleans.ca/work/jobs/the-myths-about-canadas-skills-gap/

Squire L.R. (2004), "Memory systems of the brain: A brief history and current perspective," Neurobiol Learn Mem. 2004;82: 171–177. pmid:15464402 doi: 10.1016/j.nlm.2004.06.005

Statistics Canada (1996), Census 96. http://www12.statcan.gc.ca/access_acces/archive.action-eng.cfm?/english/census01/info/96-2b-en.pdf

Statistics Canada (2001), "Content of the 2001 Census questionnaires," http://www12.statcan.ca/english/census01/Info/content.cfm#questionnaires

Statistics Canada (2004), "2001 Census Technical Report: Occupation," Cat. No. 92-388-XIE. http://www12.statcan.gc.ca/english/census01/Products/Reference/tech_rep/occupation/index.cfm

Statistics Canada (2012), National Occupational Classification (NOC) 2011, Catalogue no. 12-583-X. http://www.statcan.gc.ca/pub/12-583-x/12-583-x2011001-eng.pdf

Stoeckel, Althea (1976), "Presidents, professors, and politics: the colonial colleges and the American revolution," *Conspectus of History* 1(3):45–56.

Stone, Jeff (2015), "Hacker Exfocus Blamed For Knocking Rutgers University Offline With DDoS Attack, Even After Expensive Upgrade," IBT. http://www.ibtimes.com/hacker-exfocus-blamed-knocking-rutgers-university-offline-ddos-attack-even-after-2117247

Sweetman, Arthur (2003), Immigrant source country education quality and Canadian labour market outcomes, Kingston, Ontario: Queen's University, School of Policy Studies.

Tal, Benjamin. (2012). The Haves and Have Nots of Canada's Labour Market. In Focus, December 3, 2012. CIBC. http://research.cibcwm.com/economic_public/download/if_2012-1203.pdf

Tsang, Mun C., Russell W. Rumberger and Henry M. Levin. 1991. "The impact of surplus schooling on worker productivity." *Industrial Relations: A Journal of Economy and Society*. Vol. 30, no. 2. p. 209–228.

Tucker, Erika (2016), "University of Calgary pays $20,000 ransom to cyber attacker," Global News, June 7, 2016. http://globalnews.ca/news/2747014/university-of-calgary-pays-20000-ransom-to-cyber-attacker/

Uppal, Sharanjit and Sébastien LaRochelle-Côté (2014a), "Changes in the occupational profile of young men and women in Canada." *Insights on Canadian Society*, April, Statistics Canada Catalogue no. 75-006-X.

Uppal, Sharanjit and Sébastien LaRochelle-Côté (2014b), "Overqualification among recent university graduates in Canada," Insights on Canadian Society, April, Statistics Canada, Catalogue no. 75-006-X. http://www.statcan.gc.ca/pub/75-006-x/2014001/article/11916-eng.htm

US Department of Education, Digest of Education Statistics 2013, Table 311.40, http://nces.ed.gov/programs/digest.

Walters, Helen (2014), ""We need to change everything on campus," IDEAS.TED.COM. http://ideas.ted.com/we-need-to-change-everything-on-campus-anant-agarwal-of-edx-on-moocs-mit-and-new-models-of-higher-education/

Xia, Xing (2016), "What Explains the Rise of For-Profit Universities? Evidence from Dental Assistant Programs," seminar paper, Department of Economics, Columbia University. http://www.columbia.edu/~xx2147/JMP_XingXia.pdf