

# Talking Points

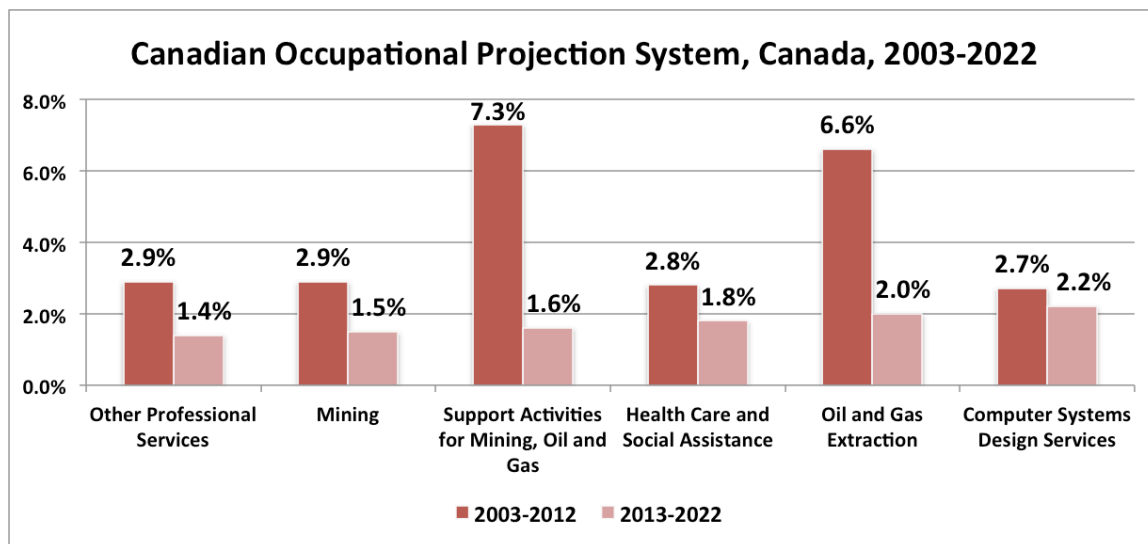
## Our Human Capital Strategy: Invest and Utilize

By: Kerri Neil

### NL Employment Paradox: Falling Employment, Labour Shortages?

Canada, like many of its developed neighbours, has a labour market that is running on two speeds. In the fast lane are the computer programmers and engineers that companies are competing for, seducing them with higher salaries and better benefits.<sup>i</sup> Driving just behind them are workers in the construction industry, particularly in the trades, who find themselves swerving lanes, subject to the volatilities of the economy and who, in many provinces, are now headed to the off ramp for a definite slowdown.<sup>ii</sup> For most occupations, having recovered from the 2008-2009 slowdown, there is now a period of relative stagnation and these workers are in the slow lane. After the Great Recession, \$100 oil helped fuel Canada's economy, but many economists are skeptical this will happen in the next decade.<sup>iii</sup> Sustaining employment at peak levels is unrealistic for resource-dependent occupations. Diversifying our economy to be less dependent on resource extraction will take time but adapting to the technology-driven 21<sup>st</sup> century is imperative

In 2012, the Government of Canada analyzed employment growth in 33 industries and projected how these industries would grow in terms of productivity and job openings.<sup>iv</sup> While most declines were expected to be in the manufacturing sector (paper, electronic, textiles), growth was largely expected in the services and technical skills sectors. Computer systems designs services were expected to see the most growth, while professional business services (mostly made up of architectural, engineering and related services) were expected to be in high demand but to be constrained by difficulties in finding and retaining qualified personnel.

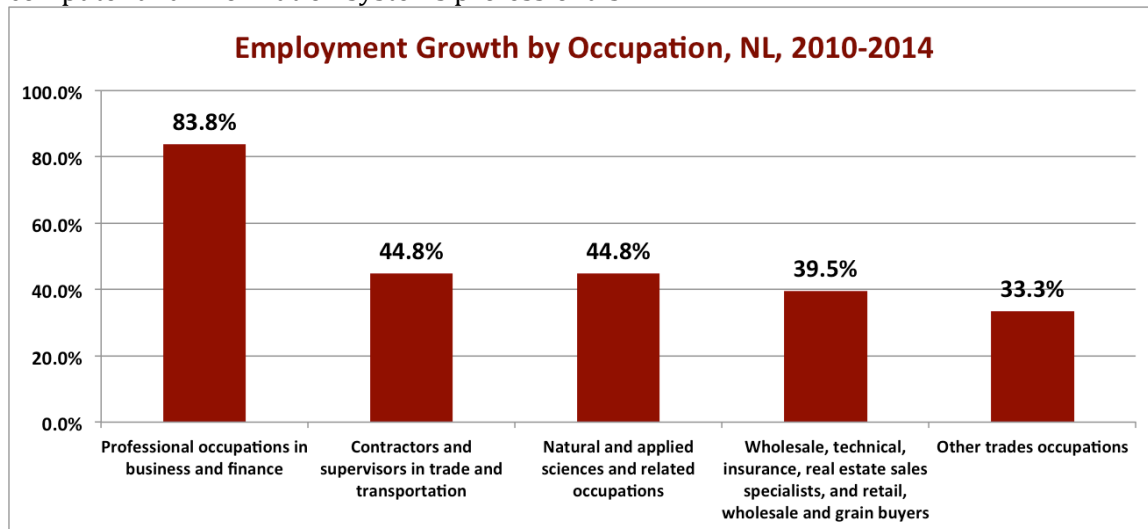


Source: Employment and Social Development Canada. "Canadian Occupational Projection System (COPS): About the Projections." *Government of Canada*.

Reviewing more recent data reflects the truth of these forecasts. Applying the marginal revenue productivity theory of wages to Canada’s labour market, the highest paid, fastest growing jobs of 2014 emphasizes what skills are in greatest demand. Here too, the benefits of an engineering or computer science degree shine bright as petroleum engineers and computer systems managers are earning \$100,000 each year, doubling average Canadian salaries.v While specializing in petroleum may not result in the same rewards over the next decade, engineers are expected to be the innovators that will drive Canada’s economy going forward.vi

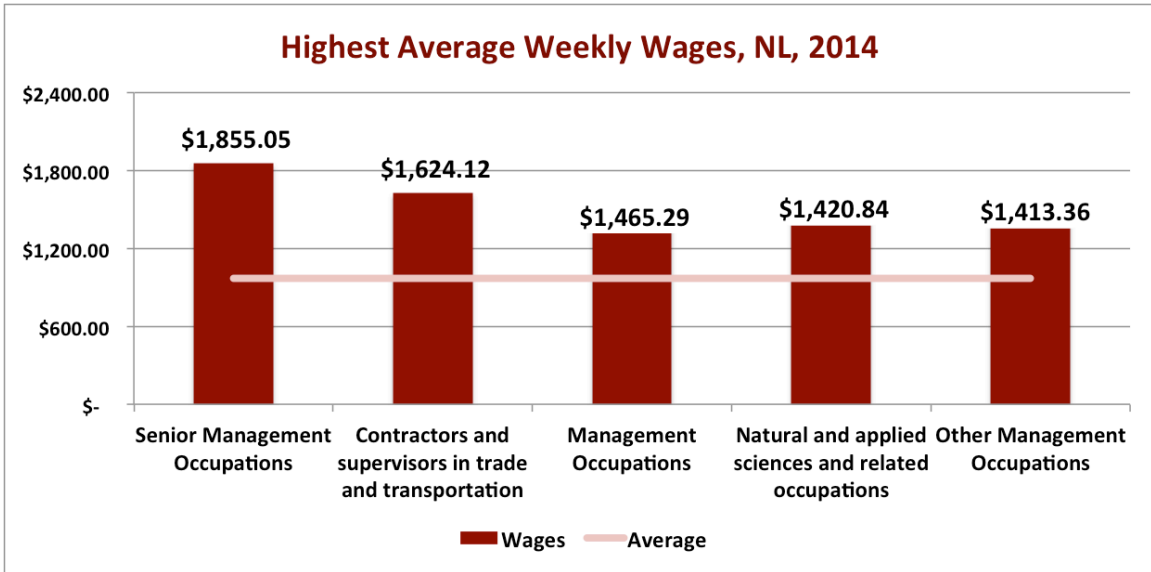
<b>Highest Paid, Fastest Growing Jobs in Canada, 2014<sup>vii</sup></b>		
<b>Job Title</b>	<b>Median Salary</b>	<b>5-Year Job Growth</b>
<b>Primary Production Manager</b>	\$110,240	32%
<b>Petroleum Engineer</b>	\$100,006	19%
<b>Public Administration Director</b>	\$97,074	21%
<b>Pharmacist</b>	\$95,680	34%
<b>Computer Systems Manager</b>	\$94,994	27%

While the advent of megaprojects has boosted blue-collar employment in the Province, careers in natural and applied science and related occupations occupied second place for the fastest growing industries in Newfoundland and Labrador in the past 5 years at 44.8% growth. These careers are largely Science, Technology, Engineering and Mathematics (STEM) positions, including physical and life science professionals, mathematicians, and computer and information systems professionals.



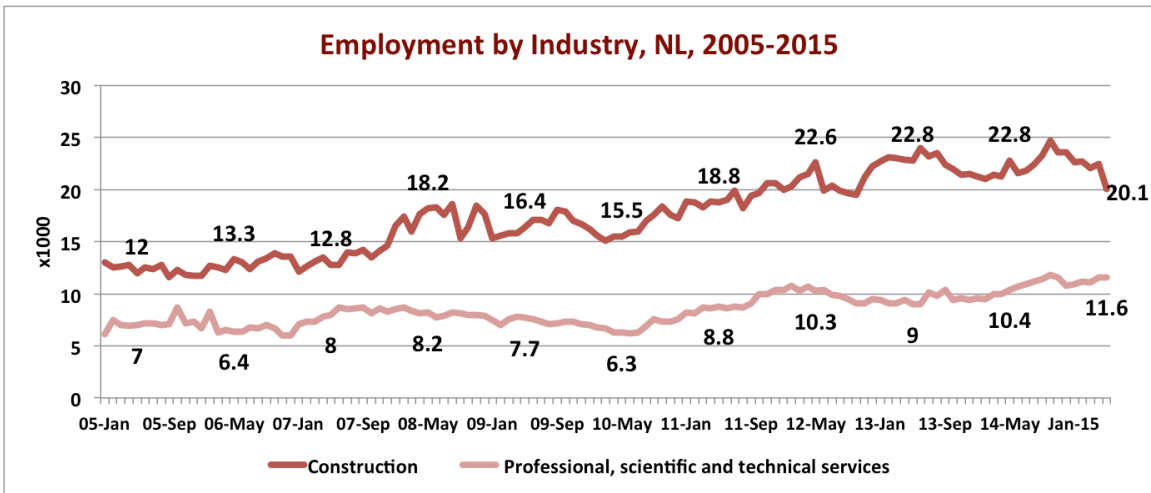
Source: Table 2820010 - Labour force survey estimates (LFS), by National Occupational Classification for Statistics (NOC-S) and sex, annually (Persons unless specified)

Similarly, careers in the natural and applied sciences and related occupations are in the top 5 highest paid professions in Newfoundland and Labrador. At \$1420.84/week, wages in these **STEM** fields are 47% higher than average wages.



Source: Table 2820010 - Labour force survey estimates (LFS), by National Occupational Classification for Statistics (NOC-S).

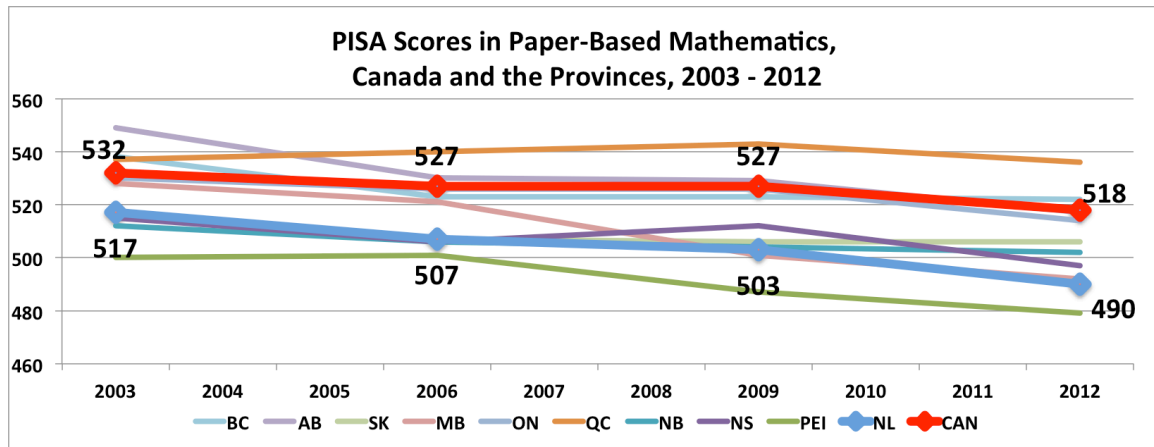
Comparing employment by industry, carers in professional, scientific and technical industries are not subject to the same volatility as the construction industry and they are growing. While the construction industry employs nearly double as many employees, employment is expected to decrease as megaprojects finish up and efforts should be focused on vitalizing more scientific and technical occupations.



Source: Table 2820088 - Labour force survey estimates (LFS), employment by North American Industry Classification System (NAICS), seasonally adjusted and unadjusted, monthly (Persons) °

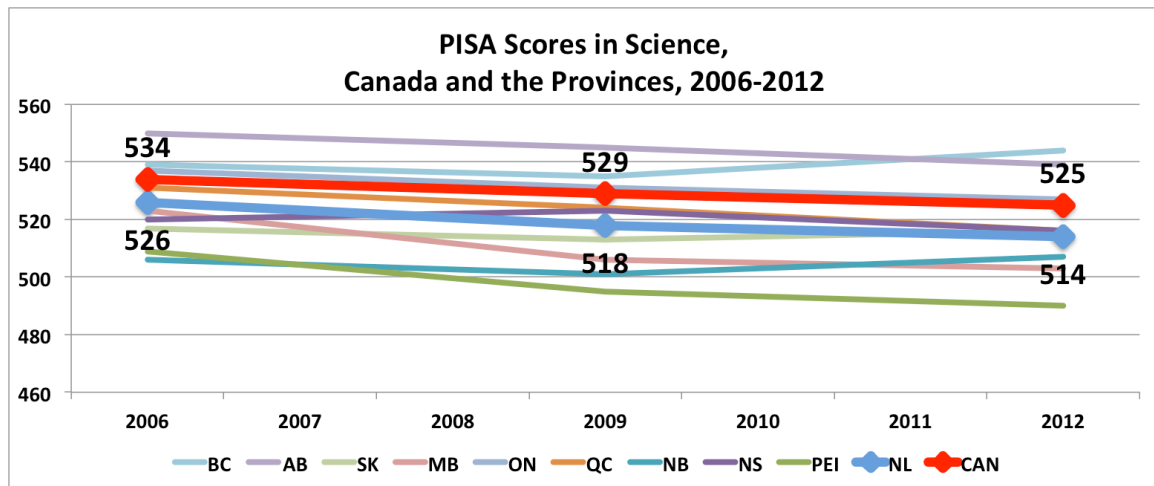
# Labour Market Success Starts in Our Schools

When it comes to computer science and mathematics training, however, this province is falling behind. From 2003 to 2012, the performance of 15-year-old Canadian students in paper-based mathematics has fallen from a score of 532 to 518.<sup>viii</sup> This is higher than the OECD average, which has stumbled from 500 to 494,<sup>ix</sup> but the downward trend is still worrisome. Ranking the provinces from highest to lowest, Newfoundland and Labrador went from 6<sup>th</sup> in 2003 with a score of 517 to 9<sup>th</sup> in 2012 with a score of 490.



Source: Brochu, Pierre, Marie-Anne Deussing, Koffi Houme, and Maria Chuy. "Measuring Up: The Performance of Canada's Youth in Mathematics, Reading and Science." *Government of Canada*. (2012): 30.

Across Canada, performance in the sciences has not been as negative as performance in mathematics. From 2006 to 2012 Canada's performance fell from 534 to 525, but British Columbia and New Brunswick did see slight academic gains during this period. Newfoundland and Labrador fared better in the sciences, ranking 5<sup>th</sup> in 2006 with a score of 526 and in 2012 with a score of 514.

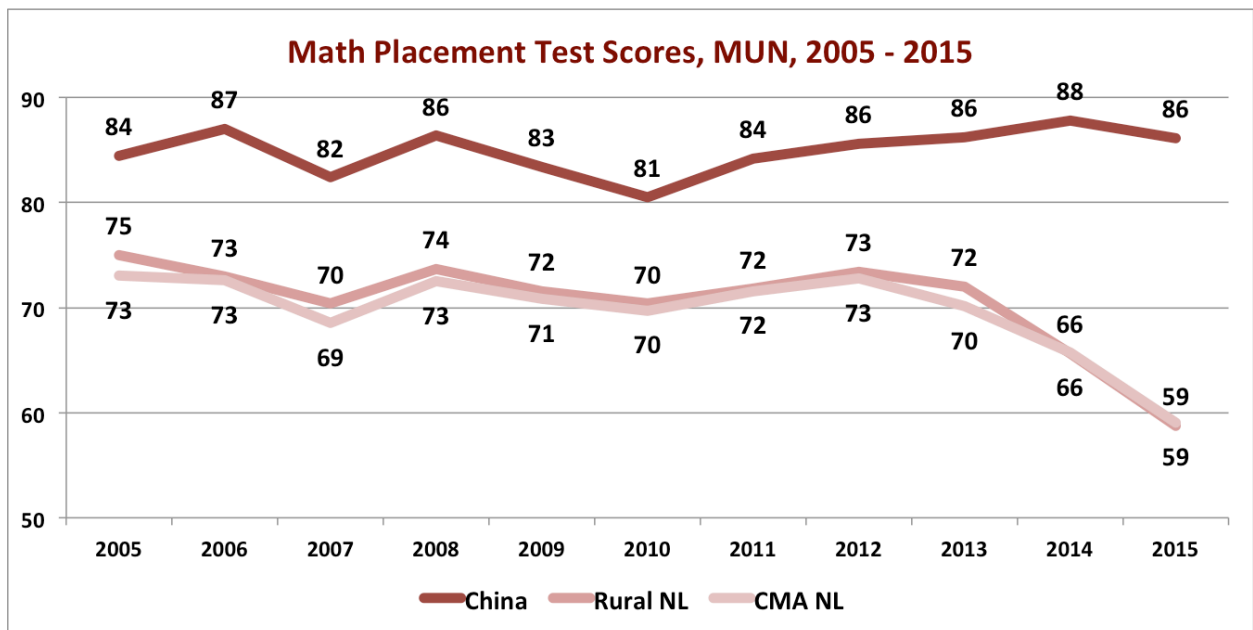


Source: Brochu, Pierre, Marie-Anne Deussing, Koffi Houme, and Maria Chuy. "Measuring Up: The Performance of Canada's Youth in Mathematics, Reading and Science." *Government of Canada*. (2012): 17.

To assess their math skills, students entering Memorial who require a math course as a degree requirement are required to complete the Mathematics Placement Test (MPT) before registration. A score of less than 55 puts students in foundational math, which reiterates many of the concepts taught in high school. A score between 55 and 75 puts students in Math 1090, a prerequisite to calculus. A score of 75 and above places students in Math 1000, an introduction to calculus, which is required to begin any engineering or science degree.

The results of these MPTs are fairly troubling. With average scores ranging in the low 70s, this suggests students are not adequately educated in mathematics concepts and are not ready for Math 1000. Declining scores in the past few years suggests this problem is worsening (though it must be noted the sample size for 2015 is so far very small). Students in more rural Newfoundland and Labrador tend to do slightly better than those in urban regions on average and within ranges. Two percent (2%) of rural students received less than 40% on the test, compared to 4% of urban students. About 12% of both groups received greater than 90%, with highs of 19% in some years, but in 2014 there was a dramatic drop to about 5% for both groups.

While the sample size for students coming from China is much smaller, the very high scores received by students originating from this region does suggest they are receiving a higher quality education.



Harold Johnson. "MPT Results" *Math Learning Centre* (2015).

*Numeracy  
Proficiency.*

*Adults Aged 26 -24*

Mean	Comparison country
285	Netherlands
285	Finland
283	Japan
283	Flanders (Belgium)
281	Korea
279	Austria
279	Estonia
278	Sweden
278	Czech Republic
278	Slovak Republic
275	Germany
273	Denmark
271	Average
271	Norway
270	Australia
269	Poland
268	Canada
264	Cyprus <sup>1</sup>
263	France
258	Ireland
257	England/N. Ireland (UK)
255	Spain
251	Italy
249	United States

Source: OECD Skills Outlook 2013: First Results from the Survey of Adult Skills. *OECD*.(2013), 82.

Reviewing adult literacy scores from the 2013 OECD survey, young adults aged 16-24 performed lower than those aged 16-65 in literacy and numeracy proficiency. Canadians aged 16-65 ranked absolutely average in literacy proficiency,<sup>x</sup> while young adults ranked 4 spots lower at 15<sup>th</sup> place.<sup>xi</sup> In numeracy, Canadians overall were less proficient, scoring statistically below the average at 14<sup>th</sup> place<sup>xii</sup> while young adults again scored below in 16<sup>th</sup> place.

In terms of technology education for Newfoundland and Labrador, students begin learning concepts in Grade 7 with a “Communications Technology” module. This course, last updated in 2002, reinforces concepts that millennials grow up with, like how to “digitize still images by using scanners, digital cameras, or video capture devices.”<sup>xiii</sup> In Grade 8, students are offered modules on “Production Technology” (2012) and a “Control Technology” (2006). The former covers design without application, teaching students the best materials for their design and the fundamental role of ergonomics and aesthetics.<sup>xiv</sup> The latter is an introduction to robotics and students are given opportunities to design and develop simple fluidics and electronics control technology systems with a brief overview of how programming is used to communicate with these technologies.<sup>xv</sup> In Grade 9 students are introduced to an “Energy and Power” technology module, which introduces them to problem solving with technological solutions.<sup>xvi</sup>

After junior high, technology courses become electives, lowering the number of students who are engaged in these courses and potentially the number that are offered at high schools around the province. “Integrated Systems Technologies 1205” (2002) lets students design an integrated system with “physical systems external to the computer, sensing and control, interfacing components, and a computer programming language.”<sup>xvii</sup> To build upon such information students are only offered one other course,

“Robotic Systems Technologies 3205” which focuses on designing and building a robotics system.<sup>xviii</sup>

In terms of communication technologies, the courses offered seem fairly out-dated as the course outlines refer to discarded machinery. “Communications Technology 2104”, for example, reviews basic graphic communication, animation and marine communications technology. Under basic graphic communication, however, obsolete machines such as phototypesetters are listed as tools that graphic designers use, rather than the more ubiquitous Photoshop.<sup>xix</sup> For the follow-up course, “Communication Technology 3104”, which covers graphic and video production, a VCR is referenced in the curriculum guide, an unused machine that has been upgraded with innovations several times over since the early 2000s.<sup>xx</sup>

I believe that it is safe to assume that teachers do not blindly follow these curriculum guides but it is worrisome to learn, in my opinion, how out-dated they are. Communications

technologies are rapidly changing and students born after 2000 may not know what a VCR is. In theory these course are important, as students must be equipped with the skills to design websites and mobilize their knowledge through web-based platforms. Reviewing the Department of Education's curriculum guides, in my opinion, paints a bleak picture of how well the provincial government is adapting to the 21<sup>st</sup> century.

As computers become more integrated into our lives, computer software and cyber security are expected to be some of the fastest growing job markets.<sup>xxi</sup> To meet this demand, computer-coding logic should begin in primary education and continuously taught year over year as done with mathematics. Computer coding builds upon itself and given the wide range of software and languages to teach, there is enough to keep students busy until senior graduation.

A great example of a public education system adapting to new labour market needs is England's new computing curriculum that emphasizes computer coding and programming skills.<sup>xxii</sup> This includes 3 key stages starting at age 5 with teaching children to understand algorithm logic and ending at age 14 where they will be able to create their own programs using two or more programming languages. By partnering with software giants like Google and Microsoft, the UK government has ensured the skills taught met industry needs.

Canada, however, has been slow to adapt to this new curriculum. While 80% of Canadians believe computer-programming skills should be taught in school, the current system now is fairly patchwork, with children, teachers and parents driving these initiatives more than provincial or federal governments.<sup>xxiii</sup> Some schools have Coding Clubs, others do have courses in their curriculum

Rather than jumpstarting students at an early age, many schools in Canada are introducing computer programming more gradually. A program called TechU.me is pairing Grade 10 and Grade 3 students to create basic apps.<sup>xxiv</sup> Scratch, software designed to be less intimidating, and more user-friendly, is being used in New Brunswick to teach young learners computer programming.<sup>xxv</sup>

New Brunswick seems an exception to this rule, as the provincial government recently launched their 10-year education plan that focuses on increasing STEM-related courses and including coding early in the curriculum.<sup>xxvi</sup>

Much of the push for putting programming in schools is being done by tech companies. Google Canada donated \$1.5 million to Actua's Codemakers project, which seeks to offer hands-on computer science education to more than 100,000 students in workshops and camps.<sup>xxvii</sup> Microsoft spends \$45 million annually on free courses for youth focused on code-making and games.<sup>xxviii</sup> Cisco Canada is working on a mentoring program where their computer engineers will have high school students work alongside them during the 2015 Toronto Pan Am games. These firms understand that industry growth will depend on our future generations, and equipping them with the skills to design software and program computers is essential.

Students are also pushing for this change. Across the country, students are creating their own Coding Clubs<sup>xxix</sup>, pursuing independent studies, and registering in computer-based summer camps<sup>xxx</sup> to make up for what their public schooling is missing.

## Conclusion.

At Memorial, degrees in Science, and Engineering and Applied Science are in high demand, comprising 19.7% and 8.6% of the undergraduate and 20.5% and 15.5% of the graduate student body, respectively.<sup>xxxix</sup> While there are no data dividing faculties by country/province of origin, a recent, unreleased report by the Department of Advanced Education and Skills has found that 90% of Newfoundlanders, 43% of Canadians from other provinces and 71% of international students remained in the province two years after graduation.<sup>xxxix</sup> This suggests the students enrolled in these programs may stay within the Province and their skills could be locally used.

There have already been numerous success stories of computer and technology-based companies that are receiving worldwide recognition. Verafin, a St. John's start-up, detects fraudulent behaviour for banks around the world, and is forecasting annual revenue of \$30-million.<sup>xxxix</sup> SULIS Subsea Corporation (formerly Go Beyond Consulting Inc.), in Mount Pearl, is developing leading-edge underwater camera software that has gained international recognition for the CEO's role in developing cameras capable of filming Mariana's Trench for James Cameron's Deepsea Challenger mission.<sup>xxxix</sup>

Adapting to the economy of the 21st century starts with our youth. Equipping them with the skills to succeed in a computer-driven world will require teaching them the basics of how computers work. Technology companies are currently working on computers that will occupy every facet of our lives. Understanding computer logic and creating computer code will be key careers in every industry and ensuring our youth are prepared to succeed in this economy by embedding computer science and improving mathematics education in the public school curriculum is vital.

The best way to ensure students can reach their potential and their aspirations is to cover the basic skills both in literacy and numeracy. Students in Newfoundland and Labrador are falling behind in numeracy skills, thus denying them entry into those **STEM** occupations where demand and wages are growing. While there are calls for vague economic solutions such as 'diversification,' more specific policy solutions such as improving our public school system lie right before us and are in our control.



# Notes.

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- <sup>i</sup> Morgan, Gwyn. "Rising to the challenge of Canada's skills shortage." *The Globe and Mail*. April 6,
- <sup>ii</sup> "Construction and Maintenance Looking Forward." *BuildForce Canada*. (2015).
- <sup>iii</sup> Faucon, Benoit and Summer Said. "OPEC See Oil Price Below \$100 a Barrel in the Next Decade." *Wall Street Journal*. May 12, 2015.
- <sup>iv</sup> Employment and Social Development Canada. "Canadian Occupational Projection System (COPS): About the Projections." *Government of Canada*. Last modified Sept 22, 2014.
- <sup>v</sup> Harris, Peter. "So, how much are we earning? The average Canadian salaries by industry and region." *Workopolis*. February 27, 2015.
- <sup>vi</sup> Morgan. "Rising to the challenge."
- <sup>vii</sup> CB Stuff. "Full Ranking: Canada's 100 Best Jobs." *Canadian Business*. Apr 17, 2014.
- <sup>viii</sup> Brochu, Pierre, Marie-Anne Deussing, Koffi Houme, and Maria Chuy. "Measuring Up: The Performance of Canada's Youth in Mathematics, Reading and Science." *Government of Canada*. (2012): 30.
- <sup>ix</sup> Source(s): *ibid.*, 17.
- <sup>x</sup> *OECD*. "OECD Skills Outlook 2013: First Results from the Survey of Adult Skills." *OECD*. (2013), 70.
- <sup>xi</sup> *Ibid.*, 72.
- <sup>xii</sup> *Ibid.*, 80.
- <sup>xiii</sup> Department of Education: Division of Program Development. "Technology Education. Communications Technology Module. Grade 7." *Government of Newfoundland and Labrador*. (2002), 12.
- <sup>xiv</sup> Department of Education. "Production Technology Intermediate: Technology Education." *Government of Newfoundland and Labrador*. ( Sept 2012), 33.
- <sup>xv</sup> Source(s): *ibid.*, 33.
- <sup>xvi</sup> Department of Education. "Technology Education: Energy and Power Technology Module." *Government of Newfoundland and Labrador*. ( 2009), 12.
- <sup>xvii</sup> Department of Education. "Technology Education: Integrated Systems 1205." *Government of Newfoundland and Labrador*. ( 2002), 13.
- <sup>xviii</sup> Department of Education. "Technology Education: Robotic Systems Technology 3205." *Government of Newfoundland and Labrador*. Last updated June 1, 2015 Unit 5, pg. 1.
- <sup>xix</sup> Department of Education. "Technology Education: Communications Technology 2104." *Government of Newfoundland and Labrador*. Last updated June 1, 2015., 103.
- <sup>xx</sup> Department of Education. "Technology Education: Communications Technology 3104." *Government of Newfoundland and Labrador*. Last updated June 1, 2015., 54.
- <sup>xxi</sup> Dehaas, Josh. "Newfoundlander wants more coding in high schools." *Macleans*. April 10, 2014.
- <sup>xxii</sup> Dredge, Stuart. "Coding at school: a parent's guide to England's new computing curriculum." *Guardian*. Sept. 4, 2014.
- <sup>xxiii</sup> Simcoe, Luke. "Should computer programming courses be mandated for Canadian students?" *Metro*. February 5, 2015.
- <sup>xxiv</sup> Canadian Press. "Computer coding a growing trend in Canadian classrooms." *CBC*. May 1, 2014.
- <sup>xxv</sup> Source(s): *ibid.*

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<sup>xxvi</sup> “Liberals to create a 10-year plan.” *New Brunswick Liberal*. Sept. 2, 2014.

<sup>xxvii</sup> “/code:makers\_” *Actua*. Accessed May 27, 2015.

<sup>xxviii</sup> Lewington, Jennifer. “Why tech giants are investing in STEM programs for students.” Oct. 30, 2014.

<sup>xxix</sup> Beaudette, Teghan. “Winnipeg school division charts new territory in computer coding for kids.” *CBC*. December 14, 2014.

<sup>xxx</sup> Lewington. “Why tech giants are investing.”

<sup>xxxi</sup> Centre for Institutional Analysis. “Factbook 2014.” *Memorial University*. (2014): Table 5.

<sup>xxxii</sup> McLeod, James. “Students from away stay after studying in N.L.: study” *Telegram*. Dec, 19, 2014.

<sup>xxxiii</sup> Bailey, Sue. “How St. John’s company Verafin landed \$60-million – the biggest cash injection for an Atlantic Canada startup ever.” *Financial Post*. June 5, 2014.

<sup>xxxiv</sup> “Adam Gobi.” *Oil and Gas Magazine*. Accessed June 13, 2015.