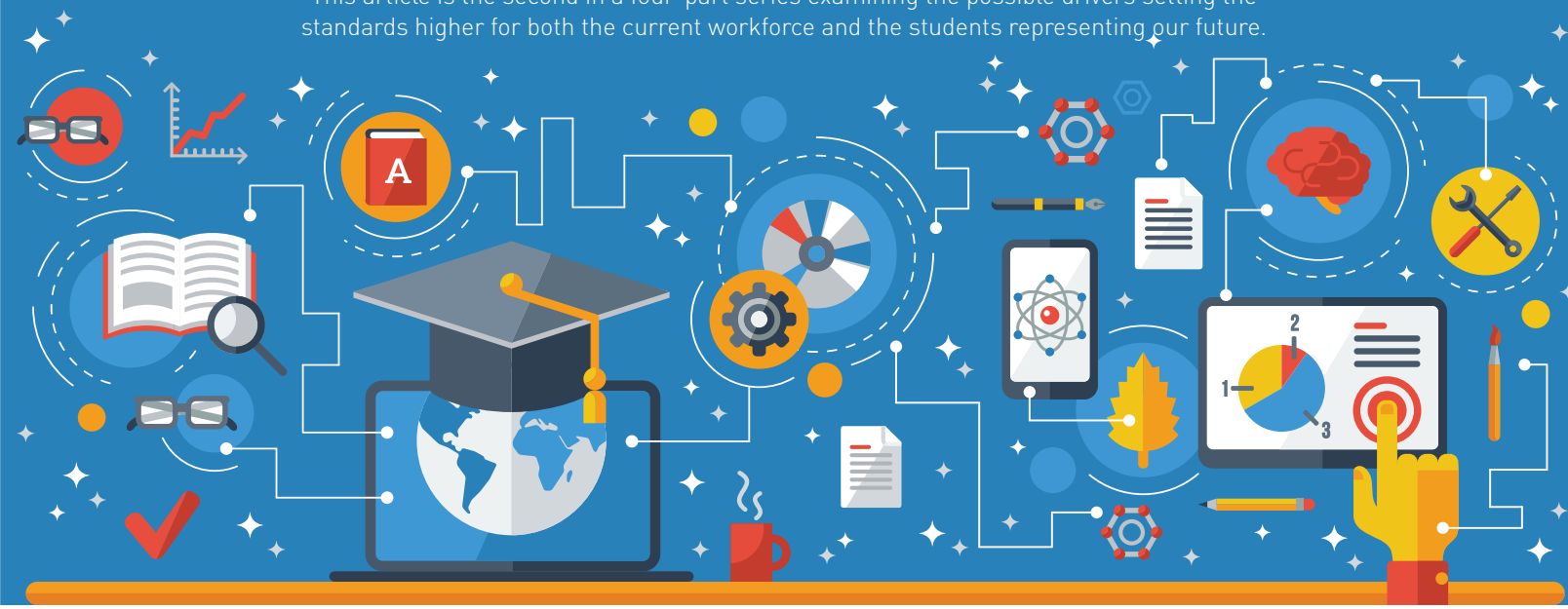
PART 2 OF 4

CLIMATE CHANGE

Drivers of higher professional standards in Canada

This article is the second in a four-part series examining the possible drivers setting the standards higher for both the current workforce and the students representing our future.



Part 2: Changes for the Education System

Canada has experienced a significant economic revolution since the Second World War, spurred by large ideological shifts in concepts such as globalization, prosperity, technology, health science, and cultural openness. Examining the workforce change from the 1950s to present day, our transformation can be viewed through the movement of manual labour positions (e.g., historical forms of millwork and farming) to new employment areas requiring sophisticated education in realms of science, digital technologies, creative content, advanced manufacturing and resource extraction[1]. The number of students attending university has risen in the last 35 years to 30%[2]. Occupations requiring college education or apprenticeship training are the most prevalent group in today's workforce, accounting for approximately one-third of those able to work[3].

PART 2 OF 4

With this change grew a divide between academic availability (programs and seats) and job market characteristics. The risk being that "[educational] institutions may be the most important public institutions in Canada to ensure a vibrant and robust quality of life and economy," as described in a report published by the Higher Education Quality Council of Ontario (HEQCO)[4]. In all provinces, it was found that post-secondary education positively correlated with labour market success, individual earnings, citizen engagement, and contributions to the economy. The mismatch, however, can be highlighted in the Parliamentary Budget Officer's estimates that the proportion of over-qualified working university graduates (aged 25 to 34) has been on an upward trend since the early 1990s, reaching 40% in 2014. The rate of over-qualification for recent college graduates remains roughly equivalent to the mid-1990s at 34% in 2014, a consistently high value[5].

The divide has been driven by a multitude of well-intended but misdirected priorities from parents, students and governments with minimal involvement or direction from the Canadian business community[6]. HEQCO President Harvey Weingarten explains that "… trying to make all institutions to be all things to all people… offers less real choice to students, threatens rather than strengthens the unique contributions and qualities of each of our institutions and is simply not affordable for either students or taxpayers."[7] By understanding and prioritizing driving influencers of demand and supply, academic institutions can start to realign themselves and strengthen the bridge.

Let us take a moment to consider the upcoming themes as opportunity for disruptive innovation, "a process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors."[8] In plain language, disruptive innovation respectfully acknowledges the status quo in the academic setting but strives for the creation of something different through incremental change. It seeks to design a product/service according to the consumer's perspective (e.g., students and employment market) versus the providers (e.g., parents and government). "By its very nature, disruptive innovation provokes organizational, professional, and cultural controversy,"[9] but it can drive greater resource and fiscal efficiency while satiating consumers. The academic health centre's mission of education, clinical care and research is "ripe for disruption" according to experts, as it is threatened by decreasing revenues and increasing expenses[10]. The same can be argued for the academic arena considering the reduction of public funding to approximately half of post-secondary education institutions' operating budgets today, a decrease of more than 90% since the 1960s[11].

The divide has been driven by a multitude of well-intended but misdirected priorities from parents, students and governments with minimal involvement or direction from the Canadian business community.

If we consider the landscape for medical laboratory science programs (MLSP; Medical Laboratory Technologists and Medical Laboratory Assistants/Technicians) the impact has affected the trajectory of the education system behind the profession, with some of the greatest pressure from information and generation–specific characteristic (students and parents). The effect of employers and governments as drivers on the academic system and profession will be discussed later in this series of articles.

Information Drivers

The creation, acquisition and evaluation of MLSP content by educational institutions has increased in depth and breadth. It showcases the strength of the programs across time as well as the increased expectations of students for entry into the workforce.

Creation: Health science curricula are targeted to meet current competency requirements of given professions. Achieving the balance between concrete information and the plasticity of new knowledge is vital for academic institutions to maintain relevancy. This tightrope is difficult to walk given the velocity of discoveries and the security required to ensure evidence-based syllabi. Nonetheless, the system is in constant motion and does not wait for institutions to catch up. For example, based on new evidence or guidelines, more than 20% of core information guiding clinical practice will change within one year. Academic medicine is experiencing a doubling of medical information almost every five years[12] and laboratory technology is changing at a rapid speed[13]. The creation and integration of new knowledge within MLSPs has transformed from on-the-job training to a breadth and depth that requires higher education as noted around the world[14]. Traditional program information is trending into new territories for future competence evaluation (formal or informal). From the Norwegian perspective, biomedical laboratory scientists study all of the medical laboratory specialties, but it is expected that there will be a greater demand for individuals with a

THE PROPORTION OF OVER-QUALIFIED WORKING **UNIVERSITY** GRADUATES REACHED

40% IN 2014

60.6%

OF 26 FRESHMEN IN 2006 EXPECTED TO EARN AT LEAST A "B" AVERAGE IN COLLEGE, COMPARED TO **26.7%** IN 1967

PUBLIC FUNDING TO APPROX. HALF OF POST-SECONDARY EDUCATION INSTITUTIONS' OPERATING BUDGETS HAS DECREASED MORE THAN

90%

SINCE THE 1960s

specialized background in gene technology, bioinformatics, and the ability to guide and train other health personnel and users for point-of-care devices and self-monitoring[15]. Medical laboratory science programs in Canada have walked the same path and are likely to follow a similar trajectory of continued complexity and novelty within academic curricula.

Acquisition: In MLSPs, there is a level of consistency due to biology fundamentals and routine laboratory testing which creates an ease in exposing students to didactic and clinical learning for specific competencies (application of rote memorization). However, teaching to a delimited set of tasks only, it is possible to "risk obsolescence" as new technologies are integrated[16] (e.g., MALDI-TOF mass spectrometry) which is a concept of particular importance to the technology-driven laboratory profession. The potential risk can be demonstrated in 36% of students not demonstrating any significant improvement in learning over four years of U.S. college (various programs) on key measures of critical thinking, complex reasoning and writing[17]. If we teach students adaptive expertise (higher level learning), the ability to both efficiently use past knowledge and experiences to innovatively create new knowledge and ideas in response to novel problems[18], we can prepare students for greater success in the current climate. Such education models are more prevalent in medicine and nursing, as these professions deal more with direct patient care. However, the application of adaptive expertise training in MLSPs can be seen. As a simple example, laboratory information systems differ across the nation; however, there is a routine and mandatory set of overarching processes to entering information. If we teach to the process logic rather than where the "button" is located, we can enable students to learn more complex adaptive skills. Such mechanisms of teaching can be applied to highly dynamic and complex environments such as the hospital setting during clinical placements. "The key is that how we teach students is probably as, if not more, important than what we teach."[19]

To a certain extent, programs must be naturally integrating this concept into practice due to the maintained relevance of MLSPs and accreditation continuation. As the profession transforms further into informational leaders taking a more visible role (as discussed in Part 1 of this series), the way in which students acquire knowledge through reformed teaching models will continue to drive the profession forward.

Evaluation: There is a general trend in Canada[20] and the United States since the late 1980s for an increase in the number of high grades, referred to as "grade inflation". Only 1.3% of entering freshmen in a 2006 report were obtaining a C average in high school compared with 8.6% in 1966. Moreover, upon college entry, 60.6% of 26 freshmen in 2006 stated that they expect to earn at least a B average in college compared to only 26.7% in 1967. Demographic considerations such as older students entering college for the first time, parental income steadily increasing among entering freshmen, the increased interest in biological and health science on the rise (mainly women)[21] are generally accounted for in such statistics. Although medical laboratory science program data was not identifiable, it is likely that a similar involuntary trend has existed given the consistency across diverse programs (an area for potential research). Grade inflation does not propel a profession forward though. In fact, it can hamper or mask true growth instead. Nonetheless, it facilitates the importance of evaluation for knowledge, skills, ability and judgement of students and should open discussion from local, provincial and national competency representatives.

Generational Drivers

The impact of parental values and expectations coupled with defining generational characteristics have resulted in a student transformation which demands higher quality experience from academic institutions while altering their personal investments from previous generations. Parental investment, emotional and fiscal, has also brought forth an additional dynamism as they are providing greater support for their school-aged children than ever before.

Student Characteristics: Students have changed as proven through research and reflections of generational characteristic

42%

OF CANADIANS UNDER 30 YEARS OLD STILL LIVE IN THEIR PARENTS' HOME.

A **15%** INCREASE SINCE 1981.

FROM 1990 TO 2014, THE NATIONAL AVERAGE TUITION FEE HAS SEEN AN INFLATION-ADJUSTED INCREASE OF MORE THAN

155%

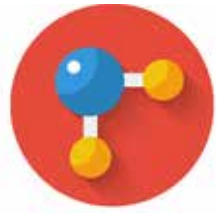
models.[22] Millennial students are better informed, have greater access to immediate information, feel deserving and expect more from others in producing quality experiences. In relation to the academic setting, these new student characteristics promote greater dependence on the education system than in previous years. These students want to be "emotionally supported" during their undergraduate education (as partially demonstrated by the rise of mental health and support initiatives in academic settings) and no longer accept the academic institution as defining the standard but rather feel that they should.[23] However, their demands foster deeper relationships and knowledge acquisition that promote academic achievements and heighten standards. Graduates who reported having at least one professor who made them excited about learning, cared about them and provided mentorship as they pursued their goals, had more than double the chance of having a positive personal life and feeling engaged in their work. The current student who also thirsts for and thrives on experiential or deep learning such as term-long projects, research experience in a lab, experiencing mentored internships or community-based projects is twice as likely to be engaged in work. MLSPs are shifting to new education models that foster such requirements. In response, the driver produces students with hard skill acquisition but also important, greater soft skills[24] acquisition, the more valued trait required by employers.[25]

Parental Characteristics: As Generation X sees their children go through higher education programs, the work ethic and values they have are superimposed on their child's experience in school. Gen Xers want structure and direction but are sceptical. They see work as a difficult challenge and as a result are expecting the same experience for their children. With a leadership style of asking "why" and valuing entrepreneurial interactions, they want to ensure their children succeed in a manner that is unprecedented in previous generations. In fact, parental expectations for children are a viable predictor of post-secondary aspirations in children.[26] The extent and form of parental involvement is strongly influenced by family social class, maternal level of education, material deprivation, maternal psycho-social health and single parent status.

Also, the higher the level of academic attainment by students, the more parents get involved.[27] Given the rise of students entering MLSPs with prior degrees, it can be speculated that parents are greatly involved in the academic settings more and more, in line with general trends. In addition, there is an increase in parents providing funding and accommodations (pre, peri and post-schooling), increasing their investment in their children's education outcome.[28] As an example, 42% of Canadians under 30 years old still live in their parents' home and is projected to continue rising, which is a substantial increase from 15% in 1981. From 1990 to 2014, the national average tuition fee has seen an inflation-adjusted increase of more than 155%.[29] All characteristics combined result in parental expectations and pressure that academic programs provide value and future prosperity for their students to repay for their sacrifices.

Conclusion

The education by MLSPs today is increasingly superior to times before, as key information and generational drivers contribute to shape the pathway forward, in addition to employer and government expectations. Supported by educators and administration, educational redesign using futurist models must continue with an understanding of the changing professional identity and needs of the health care system. An alignment between these realms is imperative moving forward.



LAURA ZYCHLA
Researcher, CSMLS

REFERENCES:

- [1]Coates K. (2015) *Career Ready: Towards a National Strategy for the Mobilization of Canadian Potential*. Last Retrieved July 18 2016 from www.ceocouncil.ca/wp-content/uploads/2015/03/Career-Ready-Ken-Coates-final-March-251.pdf
- [2]Denley R. (2016). *Higher Education is Not a Magic Wand, Millennials*. Last Retrieved July 18 2016 from http://ottawacitizen.com/opinion/columnists/denley-higher-education-is-not-a-magic-wand-millennials
- [3]Statistics Canada (2015). *Portrait of Canada's Labour Force: National Household Survey, 2011*. Last Retrieved July 18 2016 from www12.statcan.gc.ca/nhs-enm/2011/assa/99-012-x/99-012-x2011002-eng.cfm#a2
- [4]Weingarten HP, Hicks M, Jonker L, Smith C, & Arnold H. (2015). *Canadian Post-secondary Performance: IMPACT 2015*. Last Retrieved July 18 2016 from www.heqco.ca/SiteCollectionDocuments/HEQCO_Canadian_Post-secondary_Performance_Impact2015.pdf
- [5]Parliamentary Budget Officer (2015). *Labour Market Assessment 2015*. Last Retrieved July 18 2016 from www.pbo-dpb.gc.ca/web/default/files/Documents/Reports/2015/Labour%202015/Labour_Market_Assessment_2015_EN.pdf
- [6]Coates K. (2015) Career Ready: *Towards a National Strategy for the Mobilization of Canadian Potential*. Last Retrieved July 18 2016 from www.ceocouncil.ca/wp-content/uploads/2015/03/Career-Ready-Ken-Coates-final-March-251.pdf
- [7]Higher Education Quality Council of Ontario (2016). *Differentiating Ontario's Universities: Time to Go Bold*. Last Retrieved July 18 2016 from www.heqco.ca/en-CA/About%20Us/News%20Releases/Pages/Summary.aspx?link=111
- [8]Christensen CM. (1997). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Boston, Mass Harvard Business School Press.
- [9]Boston-Fleischhauer, C. (2016). Beyond Making the Case, Creating the Space for Innovation. *Journal of Nursing Administration, 46(6)*, pp. 295-6.
- [10]Kahn MJ, Maurer R, Wartman SA, & Sachs BP. (2014). A case for change: Disruption in academic medicine. *Academic Medicine, 89(9)*, pp. 1216-9.
- [11]Canadian Federation of Students (2015). *The Impact of Student Debt*. Last Retrieved July 18 2016 from http://cfs-fcee.ca/wp-content/uploads/sites/2/2015/03/Report-Impact-of-Student-Debt-2015-Final.pdf
- [12]Apler BS, & Ehlich A. (2012). *How Much Does Practice-Guiding Medical Knowledge Change in One Year?*. Last Retrieved July 18 2016 from www.medicine20congress.com/ocs/index.php/med/med2012/paper/view/1028
- [13]Institute of Medicine (US) Committee on Medicare Payment Methodology for Clinical Laboratory Services (2000). Medicare Laboratory Payment Policy: Now and in the Future, Technology Trends in the Clinical Laboratory Industry Washington (DC): National Academies Press. Available from: www.ncbi.nlm.nih.gov/books/NBK223043/
  Lab Testing Matters (2015). *The Cost Effective Laboratory: The Changing Landscape of Laboratory Testing*. Last Retrieved July 18 2016 from www.labtestingmatters.org/the-cost-effective-laboratory-the-changing-landscape-of-laboratory-testing/
  Gwynne P. (2016). Laboratory Technology Trends: Lab Automation and Robotics. Last Retrieved July 18 2016 from www.scienceмag.org/site/products/robotfinal.xhtml
- [14]Scablan PM. (2013). A review of bachelor's degree medical laboratory scientists' education and entry level practice in the United States. The Journal of the International Federation of Clinical Chemistry and Laboratory Medicine, 24(1), pp. 1-9.
  Pernas M, Arencibi LG, & Gari M. (2012). Changes needed in basic biomedical sciences teaching in Cuban medical schools. MEDICC Review, 14(3), pp. 41-4.
- [15]The Norwegian Institute of Biomedical Science (2014). *Future Trends in Biomedical Laboratory Science: A Norwegian Perspective*. Retrieved July 18 2016 from www.nito.no/contentassets/7152ab4936194074b7b10d18500bcfa7/future-trends-in-biomedical-laboratory-science---norwegian-perspective.pdf
- [16]Khan M, Maurer R, Wartman S, & Sachs B. (2014). A case for change: Disruption in academic. *Academic Medicine*, 89(9), pp. 1216-9.
- [17]Jaschik S. (2011). *'Academically Adrift'*. Last Retrieved July 18 2016 from www.insidehighered.com/news/2011/01/18/study_finds_large_numbers_of_college_students_don_t_learn_much
- [18]Mylopoulos M, & Regehr G. (2009). How student models of expertise and innovation impact the development of adaptive expertise in medicine. *Medical Education*, 43, pp. 127–32.
- [19]Khan M, Maurer R, Wartman S, & Sachs B. (2014). A case for change: Disruption in academic. *Academic Medicine*, 89(9), pp. 1216-9.
- [20]Côté J. (2007). The Hidden Crisis in the Canadian University System. Last Retrieved July 18 2016 from http://hep.oise.utoronto.ca/index.php/hep/article/view/1759/1034
  Nieli R. (2014). Grade Inflation – Why Princeton Threw in the Towel. Last Retrieved July 18 2016 from www.mindingthecampus.org/2014/10/grade-inflation-why-princeton-threw-in-the-towel/
- [21]Prypr JH, Hurtado S, Saenz VB, Santos JL, & Korn WS. (2007). *The American Freshman: Forty Year Trends*. Last Retrieved July 18 2016 from http://heri.ucla.edu/PDFs/40TrendsManuscript.pdf
- [22]Buckley P, Viechnicki P, & Barua A. (2015). *A new understanding of Millennials: Generational Differences Re-examined*. Last Retrieved July 18 2016 from http://dupress.com/articles/understanding-millennials-generational-differences/
- [23]Canadian Alliance of Student Associations (2015). *New Report on Mental Health Reveals Troubling Indicators for Canada's College and University Students*. Last Retrieved July 18 2016 from http://casa-acae.com/new-report-mental-health-reveals-troubling-indicators-canadas-college-university-students/
  Jaschik S. (2015). Well-Prepared in Their Own Eyes. Last Retrieved July 18 2016 from www.insidehighered.com/news/2015/01/20/study-finds-big-gaps-between-student-and-employer-perceptions
- [24]Jaschik S. (2015). *Well-Prepared in Their Own Eyes*. Last Retrieved July 18 2016 from www.insidehighered.com/news/2015/01/20/study-finds-big-gaps-between-student-and-employer-perceptions
- [25]Bell D. (2015). *Bridge(ing) Entry-Level Employees an Career Readiness*. Last Retrieved July 18 2016 from http://blog.getbridge.com/bridgeing-the-gap-to-career-readiness#sthash.cde
- [26]McCarrom GP, & Inkelas KK. (2006). The gap between education aspirations and attainment for first-generation college students and the role of parental involvement. *Journal of College Student Development, 47(5)*, pp. 534-49.
- [27]Desforges C., & Abouchaar A. (2003). *The Impact of Parental Involvement, Parental Support and Family Education on Pupil Achievements and Adjustment: A Literature Review*. Last Retrieved July 18 2016 from http://bgfl.org/bgfl/custom/files_uploaded/uploaded_resources/18617/Desforges.pdf
- [28]Canadian Alliance of Student Associations (2014). *Parental Views on Post-Secondary Education: A survey of 604 Canadian Parents*. Last Retrieved July 18 2016 from www.theglobeandmail.com/globe-investor/article18988732.ece/BINARY/CASA%20Report%20Draft%20-%20Carrick%20.pdf
- [29]Canadian Federation of Students (2015). *The Impact of Student Debt*. Last Retrieved July 18 2016 from http://cfs-fcee.ca/wp-content/uploads/sites/2/2015/03/Report-Impact-of-Student-Debt-2015-Final.pdf