Canada's Magazine for Career Development Professionals

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FEATURES

07

Fostering career agility in STEM

Favoriser la mobilité de carrière en science, technologie, ingénierie et mathématiques

11

How automation and data analytics will affect jobs in Canada's energy industry

15

Changing the status quo for women in STEM

Changer le statu quo pour les femmes dans les STIM

23

Is a science degree a guarantee of employment?

Un diplôme en sciences est-il une garantie d'emploi?

29

Got med school hopefuls? Special categories can help

DEPARTMENTS

19

Case Study

Bridging the gap through profession-specific mentor matches

22

Infographic The ICT workforce today and in 2021

27 Career Briefs

31

Principles in Action Embracing external influences to help guide career exploration

33 Client Side How I found my career fit in science

37 Advertiser Index

38 10 Questions David Johnston

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A SPECIAL THANKS TO OUR REVIEWERS

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Lindsay Purchase

have mixed feelings about engaging children in STEM. On one hand, it's a vital exercise that builds confidence and facilitates career exploration. On the other, as someone who spent three summers working at an engineering and science camp, I hope to never again spend an afternoon assembling circuits with 25 six-year-olds.

Joking aside, the value of a STEM education has been well established. Even for those who don't pursue one of the many career paths it opens up, exposure

to these subjects can foster the development of critical thinking, problem-solving and analytical skills (Let's Talk Science and Amgen Canada, 2014).

However, when we think about STEM, we must also consider the labour market and social climate of our time. How will advances in technology affect these sectors? Who is included – and excluded – from pursuing STEM opportunities?

Several articles in this issue consider the changing face of STEM in an age of rapid technological transformations. Caroline Burgess suggests people pursuing careers in STEM can ride out the turbulence by focusing on four fundamentals, while Lucie Demers argues that expectations for success in science don't always align with reality. And don't miss this issue's infographic, which paints a picture of employment in the digital economy – today and in 2021.

When we talk about success in STEM, we also need to consider questions of inclusion. Rachel Morgenstern-Clarren makes the case that we're not doing enough to engage women in STEM and explains how we can do better. Also, in our Client Side feature, scientist Leola Chow takes us through her career journey and shares how she's trying to inspire girls to enter the field.

Can't get enough of our STEM issue? Continue your learning at **ceric.ca**/ **careering** with online-exclusive articles on the importance of diversity in STEM, manufacturing in Eastern Ontario and more. 'ai des sentiments mitigés lorsqu'il s'agit d'initier les enfants aux sciences, à la technologie, à l'ingénierie et aux mathématiques (STIM). D'une part, il s'agit d'un exercice crucial qui leur donne confiance et qui facilite l'exploration des carrières dans ce domaine. D'autre part, ayant passé trois étés à travailler dans un camp de génie et de sciences, j'espère ne plus jamais avoir à passer un après-midi à assembler des circuits avec 25 enfants âgés de six ans.

Blague à part, la valeur d'une éducation dans les STIM est bien établie. Même pour les personnes qui ne suivent pas l'un des nombreux parcours professionnels auxquels mène une formation dans ce domaine, l'étude de ces matières peut favoriser le développement d'un esprit critique, des aptitudes à résoudre des problèmes et des capacités d'analyse (Parlons Sciences et Amgen Canada, 2014).

Toutefois, lorsque nous pensons aux carrières dans les STIM, nous devons également prendre en compte le marché du travail et le climat social de notre époque. Comment les avancées technologiques influenceront-elles ces secteurs? Qui pourra profiter des possibilités dans les STIM et qui ne pourra pas en profiter?

Plusieurs articles du présent numéro traitent des changements dans les STIM dus aux rapides transformations technologiques. Caroline Burgess laisse entendre que les personnes qui souhaitent poursuivre une carrière dans les STIM peuvent traverser cette période mouvementée en se concentrant sur quatre éléments fondamentaux, alors que Lucie Demers soutient que les attentes de réussite en sciences ne correspondent pas toujours à la réalité. Ne manquez pas le résumé graphique de cette publication, qui illustre la situation des emplois dans l'économie numérique, aujourd'hui et en 2021.

Lorsque nous parlons de succès en STIM, nous devons aussi penser aux questions d'inclusion. Rachel Morgenstern-Clarren démontre que nous ne déployons pas assez d'efforts pour embaucher des femmes dans les STIM et elle explique comment nous pourrions nous améliorer. En outre, dans notre chronique intitulée « Client Side », la scientifique Leola Chow nous présente son parcours professionnel et explique comment elle essaie de donner le goût aux filles de travailler dans le domaine des sciences.

Vous adorez notre numéro sur les carrières en STIM? Élargissez vos connaissances en consultant le site **ceric.ca/careering** et ses articles exclusifs en ligne sur l'importance de la diversité dans les STIM, l'industrie manufacturière dans l'est de l'Ontario et plus encore.

Fostering career agility in STEM

Favoriser la mobilité professionnelle en science, en technologie, en ingénierie et en mathématiques (STIM)

Caroline Burgess



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These four fundamentals are key to success in a rapidly changing field

Ces quatre éléments fondamentaux sont essentiels au succès dans un domaine qui évolue rapidement

he number of disciplines and sub-disciplines in STEM already seems overwhelming and new fields continue to emerge. How can career development practitioners help their STEM clients navigate a diverse and increasingly digital economy? The answer, in my mind, is to focus on the fundamentals.

During 14 years as a mentor or coach to emerging adults pursuing careers in STEM, it has been my observation that career success in STEM depends on having the following:

- 1. A growth mindset
- 2. Valuable transferable skills
- 3. Relevant work experience
- 4. An internal locus of control

e nombre de disciplines et de sous-disciplines en STIM est déjà très grand et de nouveaux domaines continuent d'émerger. De quelle manière les intervenants en développement de carrière peuvent-ils aider leurs clients en STIM à s'y retrouver dans une économie diversifiée et de plus en plus axée sur le numérique? À mon avis, la réponse consiste à se concentrer sur les éléments fondamentaux.

Au cours de mes 14 années d'encadrement ou de mentorat auprès de jeunes adultes poursuivant une carrière dans les STIM, j'ai observé que le succès professionnel dans ces domaines dépend des éléments suivants :

- 1. Une attitude de croissance;
- 2. De solides compétences transférables;
- 3. Une expérience de travail pertinente;
- 4. Un lieu de contrôle interne.

Developing a growth mindset

Psychologist Carol Dweck has defined a growth mindset as a belief that your abilities can be developed through hard work and a willingness to iterate in the face of failure – to employ other strategies and try again.¹ A growth mindset is critical in STEM because of the need to upgrade or acquire new knowledge and skills to keep pace with advances in technology and changes in the economy.

The exercise outlined below is one I use with every client to encourage a growth mindset. It is based on the concept of "flow," defined by psychologist Mihaly Csikszentmihaly as an activity in which your whole being is involved and you are using your skills to the utmost.²

Write a brief description of three peak experiences that can be taken from any combination of school, work or extra-curricular activities. Each experience must have the following elements:

- It called on all of your skill or expertise (in a particular area)
- You felt challenged but not overwhelmed
- You were so engaged that you were unaware of the passage of time
- You felt a sense of power immediately after the experience, aware that you had met the challenge and, perhaps, even exceeded your own expectations

By tapping into a time when they have successfully tackled a challenge, clients seem more receptive to challenging themselves in other ways – for example, by taking a challenging course, considering a difficult degree program or applying for a job they are not completely qualified for.

Identifying key transferable skills

Valuable transferable skills are essential to agility in a dynamic economy because, unlike specialized knowledge, they can be applied in a variety of sectors; they are also the key to jumping on emerging fields. The most valuable transferable skills in STEM are mathematics, computer science and physics. These also take the most time and practice to master.

La psychologue Carol Dweck a défini l'attitude de croissance comme la croyance qu'il est possible de développer ses capacités en travaillant fort et en étant prêt à réitérer en cas d'échec – à utiliser d'autres stratégies et à essayer de nouveau¹. Il est essentiel d'avoir une attitude de croissance si on évolue

Développer une attitude de croissance

dans les STIM, car il faut absolument se perfectionner ou faire l'acquisition de nouvelles connaissances et de nouvelles compétences pour suivre le rythme des progrès technologiques et des changements économigues.

J'invite chacun de mes clients à faire l'exercice présenté ci-après pour favoriser une attitude de croissance. L'exercice s'inspire du concept du « flow », ou flux en français, défini par le psychologue Mihaly Csikszentmihalyi comme le fait de faire appel à la totalité de son être et au maximum de ses capacités pour accomplir une activité².

Faites une brève description de trois expériences optimales que vous avez vécues à l'école, au travail ou dans une activité de loisir. Chaque expérience doit comprendre les éléments suivants :

- Elle a fait appel à la totalité de vos compétences ou de votre expertise (dans un domaine particulier).
- Vous avez été stimulé, mais vous n'avez pas été dépassé.
- Vous étiez tellement concentré que vous n'avez pas vu le temps passer.
- Vous avez ressenti un sentiment d'accomplissement immédiatement après l'expérience, conscient que vous aviez relevé le défi et peut-être même dépassé vos propres attentes.

En s'inspirant d'une fois où ils ont été capables de relever un défi, les clients semblent plus ouverts à l'idée de relever d'autres défis – en suivant, par exemple, un cours difficile, en envisageant un programme d'études ardu ou en postulant un emploi pour lequel ils ne possèdent pas toutes les qualifications nécessaires.

Déterminer les compétences clés transférables

Il est essentiel de posséder de solides compétences transférables pour faire preuve d'agilité dans une économie dynamique, car contrairement aux connaissances spécialisées, elles peuvent être appliquées à divers secteurs. Elles sont aussi la clé pour percer dans des domaines émergents. Les compétences transférables les plus importantes des STIM sont les mathématiques, l'informatique et la physique. Ce sont aussi celles qui nécessitent le plus de temps et de pratique pour parvenir à les maîtriser.

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8 Careering / Winter 2019



My recommendation to clients is to start acquiring valuable transferable skills early and to keep at it. I encourage clients in high school to take as many math and computer science courses as they can, and to take Grade 11 and Grade 12 Physics even if they are not required for admission to the STEM programs they are considering.³ I encourage university clients in STEM to take a minimum of one full year of physics as well as advanced math and computer science courses, even if it means extending the length of their degrees; a BSc in biology with a minor in mathematics or computer science is a much more powerful degree than one without.

Tapping into the power of relevant experience

I encourage all of my clients, including those considering graduate or professional school, to acquire a minimum of 16 months of relevant work experience before they complete their undergraduate degrees in STEM – either through a co-operative program, or by incorporating a professional year between their third and fourth academic years.⁴

Students who have acquired relevant work experience, including industry experience, before they graduate, stand out from their peers with respect to: 1) the valuable transferable skills they have acquired and practiced, including technical and soft skills and 2) the size and diversity of their networks. In addition, these students also develop confidence from tackling challenging problems in work environments that encourage risk-taking and embrace the process of iteration.

Keeping clients in the driver's seat

I strongly believe in the capability and resourcefulness of my clients, and my interactions with them are designed to foster an internal locus of control. I give clients homework to complete before each meeting to emphasize that they are the ones driving the career development process. To encourage my clients to be intentional, I ask each of them to complete the following exercise:

Construct a personal table of values with four columns and as many rows as you need. Label the columns "Value," "Value Definition," "Importance" (score from 1 to 5) and "How Presently Lived" (score from 1 to 5). In this context, a value is defined as something that you want to experience or "live" to some degree.

I let them know that their values are likely to change as they progress in their careers and their lives, but that it is important to understand why, at this stage, they might choose one option over another.

I also ask clients considering post-secondary options to construct a pie chart that gives a percentage weight to each of the following: "opportunity to acquire valuable transferable skills," "opportunity for relevant work experience" and some combination of their values (adding to 100%). I then ask them to score and rank each of their options accordingly. Again, this exercise reinforces intentionality and an internal locus of control.

Je recommande à mes clients de commencer tôt à faire l'acquisition de solides compétences transférables et de ne jamais arrêter de le faire. J'encourage mes clients qui fréquentent l'école secondaire à suivre un maximum de cours de mathématiques et d'informatique, et à suivre les cours de physique de 11e et de 12e années, même si ces cours ne sont pas des préalables pour les programmes de STIM qui les intéressent³. J'encourage mes clients qui fréquentent l'université en STIM à suivre au moins une année complète de cours de physique, ainsi que des cours avancés en mathématiques et en informatique, même si pour cela ils doivent étudier plus longtemps pour obtenir leur diplôme; un baccalauréat ès sciences en biologie avec une mineure en mathématiques ou en informatique a beaucoup plus de valeur qu'un baccalauréat sans cette spécialisation.

Exploiter le pouvoir de l'expérience pertinente

J'encourage tous mes clients, y compris ceux qui veulent faire des études supérieures ou fréquenter une école professionnelle, à accumuler au moins 16 mois d'expérience professionnelle pertinente avant de terminer leur baccalauréat en STIM – que ce soit dans le cadre d'un programme coopératif ou en intégrant une année de travail entre la troisième et la quatrième année de leurs études⁴.

Les étudiants qui ont acquis une expérience professionnelle pertinente, y compris une expérience sectorielle, avant l'obtention de leur diplôme se démarquent de leurs pairs à cet égard : 1) par les solides compétences transférables dont ils ont fait l'acquisition et qu'ils pratiquent, notamment des compétences techniques et non techniques, et 2) par la taille et la diversité de leurs réseaux. Ces étudiants développent aussi leur confiance en s'attaquant à des problèmes difficiles dans des milieux de travail qui encouragent la prise de risques et qui favorisent l'itération.

Garder les clients en contrôle

Je crois fermement aux capacités et à la débrouillardise de mes clients, et mes interactions avec eux sont destinées à favoriser un lieu de contrôle interne. Je donne à mes clients des devoirs à faire avant chaque rencontre afin de souligner le fait que ce sont eux qui pilotent leur processus de développement de carrière. Pour encourager mes clients à agir de manière intentionnelle, je leur demande de faire l'exercice suivant :

Créez un tableau de valeurs personnelles contenant quatre colonnes et autant de rangées que nécessaire. Nommez les colonnes « Valeur », « Définition de la valeur », « Importance » (cote de 1 à 5) et « Manière actuelle de l'exprimer » (cote de 1 à 5). Dans ce contexte, une valeur est définie comme quelque chose que vous voulez vivre à un certain degré.

Je leur dis que leurs valeurs vont probablement changer au fur et à mesure qu'ils progressent dans leur vie professionnelle et personnelle, mais qu'il est important de comprendre pourquoi, à ce stade, ils choisiraient une option plutôt qu'une autre.

Je demande aussi à mes clients qui envisagent de poursuivre des études postsecondaires de créer un diagramme circulaire qui attribue une pondération en pourcentage à chacun des éléments suivants : « possibilité de faire l'acquisition d'une espérience de travail pertinente » et une certaine combinaison de leurs valeurs (pour un total de 100 %). Je leur demande ensuite d'attribuer une note et un rang à chacune de leurs options en conséquence. Encore une fois, cet exercice renforce le caractère intentionnel et le lieu de contrôle interne.

Success in STEM demands a commitment to life-long learning. It doesn't stop at graduation. I often use the visual of a climbing wall to encourage clients in transition to be intentional about next steps. Where do they want to end up? What is attainable from where they are now? For example, a client with a degree in physics is a good candidate for a transition to data science, but an intermediate step might be online courses in Python coding and machine learning. By encouraging a growth mindset and fostering an internal locus of control, I hope to impart on my clients a sense that their future is in their own hands and that it looks very bright.

Pour avoir du succès en STIM, il faut continuer à apprendre toute sa vie durant. On ne cesse pas d'apprendre au moment où l'on obtient son diplôme. J'utilise souvent l'image du mur d'escalade pour inviter mes clients qui sont en transition à choisir leurs prochaines étapes de façon délibérée. Où veulent-ils se rendre? Qu'est-ce qui est réalisable à partir de l'endroit où ils se trouvent à l'heure actuelle? Par exemple, un client qui possède un diplôme en physique est un bon candidat pour une transition vers la science des données. Cependant, comme étape intermédiaire, il pourrait suivre des cours de programmation en langage Python et en apprentissage machine. En encourageant une attitude de croissance et en favorisant un lieu de contrôle interne, j'espère montrer à mes clients que leur avenir leur appartient et qu'il s'annonce radieux!

AUTHOR BIO

Caroline Burgess, CCDP, has spent her entire career in STEM. Trained as an engineer, educator and career consultant, she has experience and contacts in industry, research and government. She has been a mentor or coach to emerging adults pursuing careers in STEM since 2004 and can be reached through her website at **CarolineBurgess.ca**.

BIOGRAPHIE DE L'AUTEURE

Caroline Burgess, CCDP, a consacré toute sa carrière aux STIM. Ingénieure, éducatrice et conseillère d'orientation de formation, elle s'appuie sur son expérience et ses contacts au sein de l'industrie, du gouvernement et du secteur de la recherche. Elle agit comme mentor ou coach depuis 2004 auprès de jeunes adultes qui poursuivent une carrière dans les STIM. Vous pouvez la joindre sur son site Web à **CarolineBurgess.ca**.

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How automation and data analytics will affect jobs in Canada's energy industry

Changes in every sub-sector of this industry are creating new or emerging opportunities for jobseekers



conomic ups and downs are not new for Canada's energy industry. However, the market downturn that started in late 2014 hit the industry particularly hard.¹ In response, the energy industry focused on gaining efficiencies through the implementation of new technologies and a 25% reduction in its workforce.²

The people, occupations and skills that remain to support the exploration, development and production of Canada's oil and gas resources today have also changed. PetroLMI – a division of Energy Safety Canada that provides labour market information and trends for Canada's energy industry – conducted research into how jobs have changed and what skills are going to be required to work in the industry going forward. PetroLMI's mandate is to collaborate with industry, government and training agencies to support and advance the development of a sustainable, skilled and productive workforce.

In June 2018, PetroLMI published a report funded by the Government of Canada's

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Sectoral Initiatives Program, A Workforce in Transition: Oil and Gas Skills of the Future, to share its research findings.

"Our research focused on key trends affecting the oil and gas labour market," says Carol Howes, Vice President, Communications and PetroLMI for Energy Safety Canada. "An important trend influencing jobs and skills – not unlike other industries - is the increase in automation and more focus on areas such as data analytics."

A deep dive into automation and data analytics

As with many other industries, the oil and gas industry is implementing automation and using more data analytics to improve its operations and decision-making in order to increase productivity, increase profitability and enhance safety.

"Automation is the use of control systems to operate equipment with minimal or reduced human intervention," explains Howes. "You've heard of autonomous cars, but for the oil and gas industry think driverless heavy haul trucks, minimally manned drill rigs or remote sensors inspecting pipelines."

Meanwhile, data analytics is the process of examining data sets to make better decisions about the information they contain.

"The oil and gas industry collects a lot of data but historically it hasn't been used to its full extent. We hear more and more about how big data is being used, and the oil and gas industry is looking at how it can use its data to better inform decisions," says Howes.

Increased use of automation and data analytics is occurring in every sub-sector of the oil and gas industry and creating new or emerging opportunities for career seekers. Following are some examples.

Exploration and production

Exploration and Production (E&P) is the sub-sector that finds and produces oil and gas. Many E&P companies are large, nationally recognized firms that employ a wide variety of workers, from land negotiators to geologists, technologists to administrative assistants, accountants to engineers, safety managers to environmental specialists.

Automation is largely a way to help workers do their jobs better by eliminating repetitive manual tasks. Companies are requiring more data scientists to apply data analytics to reduce costs. More technologists will also be needed to manage the data.

Oil sands

Oil sands – a mixture of sand, water, clay and bitumen – are produced in northern Alberta. Oil sands deposits are primarily deep in the ground and extracted via Steam Assisted Gravity Drainage (SAGD). About 20% of the deposits are shallow enough to be extracted through open pit mining. As a result, this sub-sector is heavily reliant on heavy equipment operators in addition to people with expertise in engineering, upgrading oil sands into a light/sweet synthetic crude, safety, and environmental monitoring and reclamation. Several mining operations are already piloting – or have begun using – driverless automated heavy hauler trucks, a trend that is expected to continue. The rollout of autonomous vehicles could result in job losses among heavy equipment operators across the oil sands mining sector. However, automation creates demand for instrumentation technicians and heavy equipment operators with upgraded training as these autonomous vehicles need to be maintained, repaired and updated on a regular basis.

Oil and gas services

Oil and gas service companies employ the most workers in the oil and gas industry. They provide support services during all phases of exploration and production (including oil sands). Many of the jobs are in remote field locations and use highly advanced technology.

Automation and the use of more data analytics are in early stages of adoption in this sub-sector. As more companies invest in the technology, more work will be accomplished with less equipment and fewer workers. The increase in automation means workers will continue to require mechanical skills to install or operate equipment, but they will also need to understand and operate newer electronic systems. There will be new occupations



Source: Brookfield Institute for innovation + entrepreneurship report: The Talented Mr. Robot: The impact of automation on Canada's workforce Percentages have been rounded to the nearest whole number. focused on installing, servicing and updating automated systems on drilling rigs and hydraulic fracturing equipment. Data analytics drive the ability to get more information from the field, and this requires skills in interpreting data and using the information to improve processes.

Pipelines

The pipeline sub-sector of the energy industry transports product to market. Some companies also gather, process and store oil and gas by-products. Jobs in this sub-sector are diverse, from laying pipe to consulting with communities, to working in logistics, pipeline integrity, safety or the environment, to researching in a lab developing new technologies. Pipeline companies have been early adopters of automation technologies and therefore have already made many adjustments to their workforces. Additional skills in processing and interpreting data will be needed going forward, along with IT and instrumentation technologists to install and maintain the expanding array of remote sensors and other equipment. More data scientists will also be needed to interpret the ever-expanding amount of data available, to improve equipment maintenance and operations.

Future forward

Canada's oil and gas industry recognizes the need to continue to focus on training up its existing

workforce and enhancing their safety through emerging technologies. Attracting and retaining younger workers, many of whom have become discouraged by the recent downturn, is one of the industry's future workforce challenges.

"Many of the new or emerging career opportunities will be appealing to workers who are seeking challenging, technology-driven occupations, such as directing automated rig equipment, mapping paths for autonomous trucks or managing large amounts of technical data. There will be jobs to support energy diversification and efficiencies, designing and building wind or solar installations. Many of these will be occupations that match with their values," says Howes.

For more information, you can read the report on **careersinoilandgas.com**. The website, Careers in Oil + Gas, also houses a Career Explorer online tool that allows users to not only search and compare more than 100 occupations in the oil and gas industry, but to view and apply directly to relevant job postings on the Government of Canada's Job Bank website.

AUTHOR BIO

As PetroLMI's Outreach and Communications Advisor, **Breanne O'Reilly** is responsible for communicating and distributing labour market data, trends and insights. As well, O'Reilly disseminates PetroLMI's occupational tools and resources for workforce and career planning and manages the Careers in Oil + Gas website.

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Changing the status quo for women in STEM

Changer le statu quo pour les femmes dans les STIM

Rachel Morgenstern-Clarren

Initiatives to encourage girls and women to pursue technical careers haven't translated into the realities of the workplace

Les efforts pour encourager les filles et les femmes à poursuivre une carrière technique ne se reflètent pas dans la réalité du marché du travail

his is an exciting time for women in STEM (Science, Technology, Engineering and Math) industries. However, there are still lots of challenges to overcome before true systemic change results in women being treated equally. What is the current status of women in STEM in Canada? What are the challenges and solutions? And what can be done to change the status guo?

Overview of the status of women in STEM in Canada

While there have been many initiatives designed to encourage girls and young women to pursue technical careers, as well as programs and organizations that advocate for women leaders, research from the Center for Creative Leadership shows that those investments don't translate into the realities of the workplace, where very few women are actually retained and promoted to senior roles in STEM.¹ Across the board, the quit rate is higher for women than for men in STEM;² this is especially true in the tech industry, where the quit rate for women (41%) is more than twice as high as it is for men (17%).³ Furthermore, instead of progressing into more senior engineering and leadership roles as they gain experience, many women end up moving into project management and marketing positions. This is a loss for STEM industries that must be addressed.

ous vivons une période intéressante pour les femmes qui œuvrent dans le domaine des STIM (sciences, technologie, ingénierie et mathématiques). Il reste cependant encore beaucoup d'obstacles à surmonter avant que de véritables changements systémiques puissent faire en sorte que les femmes soient traitées de manière égale. Quelle est la situation actuelle des femmes dans les STIM au Canada? Quels sont les défis et les solutions? Et qu'est-ce qui peut être fait pour changer le statu quo?

Aperçu de la situation actuelle des femmes dans les STIM au Canada

Bien qu'il y ait eu de nombreuses initiatives destinées à encourager les filles et les jeunes femmes à poursuivre une carrière technique, et qu'il existe des programmes et des organismes qui défendent les femmes dirigeantes, une étude menée par le Center for Creative Leadership révèle que ces investissements ne se reflètent pas dans la réalité du milieu de travail. En effet, très peu de femmes sont nommées ou promues à des postes de direction dans les STIM¹. Dans l'ensemble, le taux d'abandon est plus élevé chez les femmes que chez les hommes dans les STIM²; cela est particulièrement vrai dans le secteur technologique,

Careering / Winter 2019 15

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Where's the Dial Now?, a 2017 study by Toronto-based organization #MovetheDial, MaRS and PwC Canada that surveyed over 900 Canadian tech firms, confirmed that gender inequality exists in the industry. Only 5% of Canadian tech companies had a solo female CEO and only 13% of executive team members were women; 53% of tech companies had no female executives; and women accounted for an average of 8% of director roles. Additionally, 73% of firms had no women on their boards; 70% of Canadian venture capital firms that finance young tech firms had no female partners; and only 12% of all partners were women. Although this study was tech-specific, the trends are unfortunately similar for all STEM fields. According to a PEW Research Center analysis of U.S. Census Bureau data, for instance, women make up 75% of health-care practitioners and technicians, but only 25% of computer professionals and only 14% of engineering professionals.⁴

Overview of the challenges faced by women in STEM

In recent years, different studies have been conducted in order to determine why the figures on female retention and promotion in STEM fields are so dire, with the hope that companies can try to address the root of the problem. Research shows that several factors play a role in women leaving their jobs or being unable to access leadership positions.

Some of the most common issues with regard to the corporate culture are pay inequality, a lack of mentorship and coaching, implicit gender bias, unpaid maternity leave and a lack of flexibility around outside commitments, especially family.⁵ Ultimately, many women switch companies to move up the corporate ladder or end up leaving their fields altogether. Companies need to be more proactive about fostering an inclusive, collaborative work environment where women feel safe (and supported) to brainstorm, try out new ideas and put them into practice.



où le taux d'abandon des femmes (41 %) est plus du double de celui des hommes (17 %)³. De plus, plutôt que de passer à des postes d'un niveau hiérarchique supérieur à mesure qu'elles acquièrent de l'expérience, beaucoup de femmes finissent par se retrouver à des postes en gestion de projet et en marketing. Cette situation représente une perte pour les entreprises œuvrant dans le domaine des STIM et il faut y remédier.

Fruit d'une collaboration entre l'organisme de Toronto #MovetheDial, MaRS et PwC Canada, le rapport Where's the Dial Now? (2017), pour lequel plus de 900 sociétés canadiennes du secteur de la technologie ont été sondées, a confirmé l'inégalité entre les sexes dans ce secteur. Seulement 5 % des sociétés canadiennes du secteur de la technologie avaient une femme chef de la direction, et seulement 13 % des membres de la direction étaient des femmes; 53 % des sociétés du secteur de la technologie ne comptaient aucune femme parmi leurs dirigeants, et les femmes occupaient seulement 8 % des rôles d'administrateurs. De plus, 73 % des conseils d'administration de ces sociétés ne comptaient aucune femme; 70 % des sociétés de capital de risque qui financent les nouvelles entreprises du secteur de la technologie ne comptaient aucune femme parmi leurs associés; et les femmes représentaient seulement 12 % de tous les associés. Bien que cette étude portait uniquement sur le secteur de la technologie, les tendances sont malheureusement similaires dans tous les domaines liés aux STIM. Par exemple, selon une analyse des données du U.S. Census Bureau effectuée par le PEW Research Center, les femmes représentent 75 % des professionnels et techniciens de la santé, mais seulement 25 % des professionnels de l'informatique et 14 % des professionnels de l'ingénierie⁴.

Aperçu des difficultés vécues par les femmes dans les STIM

Différentes études ont été menées au cours des dernières années pour déterminer pourquoi les chiffres de la fidélisation et de la promotion des femmes dans les STIM sont si bas, dans l'espoir d'amener les sociétés à s'attaquer aux causes du problème. Des études révèlent plusieurs facteurs expliquant pourquoi les femmes quittent leur emploi ou sont incapables d'accéder à des postes de direction.

Au nombre des problèmes les plus courants liés à la culture d'entreprise, on compte la disparité salariale, le manque de mentorat et d'encadrement, le préjugé sexiste implicite, les congés de maternité non payés et le manque de souplesse relativement aux engagements externes, surtout familiaux⁵. Beaucoup de femmes finissent par changer d'entreprise pour pouvoir gravir les échelons ou par quitter complètement le domaine. Les entreprises doivent agir plus rapidement pour favoriser un milieu de travail inclusif, axé sur la collaboration, où les femmes sentent qu'elles sont libres de trouver de nouvelles idées et de les mettre à l'essai en toute sécurité.

Solutions pour fidéliser les femmes et améliorer leur accès à des postes de direction dans les STIM

Les problèmes expliquant pourquoi les femmes dans les STIM quittent leur emploi ou ne parviennent pas à gravir les échelons de la haute direction sont complexes et interreliés, tout comme les solutions.

16 Careering / Winter 2019

Solutions for increasing women's retention and access to leadership in STEM

The issues connected to why STEM women leave their jobs and/or are unable to rise to the ranks of upper management are complex and interrelated, as are the solutions. However, there are several

straightforward steps that companies can take to improve the workplace culture for women and help buck these trends.

In the office, employers can provide opportunities for mentorship and peer coaching to their female employees – recognizing their talent and potential by investing in their professional development.⁶ Both mentoring and peer coaching offer a safe environment for developmental feedback to be exchanged and mutual learning to occur, which helps not only the women, but the company.⁷

Outside of work, women often place a high premium on flexibility, so that they can pursue personal interests and/or have more time with their families. If women have children, an employer can invest in their future at the company by providing paid maternity leave as well as better (and more) childcare options to relieve the financial strain, while also giving the employee more time and energy to focus on her career.⁸ "Companies need to be more proactive about fostering an inclusive, collaborative work environment where women feel safe (and supported) to brainstorm, try out new ideas and put them into practice."

« Les entreprises doivent agir plus rapidement pour favoriser un milieu de travail inclusif, axé sur la collaboration, où les femmes sentent qu'elles sont libres de trouver de nouvelles idées et de les mettre à l'essai en toute sécurité. »

YES, a non-profit organization that is committed to career and business development for Quebecers, has developed a variety of initiatives over the past seven years to promote the recruitment, retention and advancement of women in STEM. Its Women in Tech project (2012-2015) focused on supporting and encouraging women to break into the tech industry, with a coaching series, mentorships, internships and workshops.

Currently, YES is running a project called *Systemic Change: Advancing Women in STEM*, which aims to increase the understanding of systems and institutional practices that affect women in STEM; provide access to strategies, tools and frameworks to help with the promotion and retention of women in STEM; and promote internal initiatives that will support female employees and influence their organizations to counteract gender bias.

These initiatives are just a couple examples of how YES is working to engage employees and management across Canada to advance the status of women in STEM. Il existe cependant quelques mesures simples que peuvent adopter les entreprises pour améliorer la culture du milieu de travail pour les femmes et contribuer à renverser ces tendances.

Au bureau, les employeurs peuvent fournir à leurs employées des occasions d'obtenir du mentorat et d'être encadrées par leurs pairs – reconnaissant leur talent et leur potentiel en investissant

dans leur perfectionnement professionnel⁶. Tant le mentorat que l'encadrement par les pairs offrent un contexte sûr pour l'échange, le perfectionnement et l'apprentissage mutuel, ce qui profite non seulement aux femmes, mais aussi à l'entreprise⁷.

À l'extérieur du travail, les femmes accordent souvent beaucoup d'importance à la capacité de poursuivre des intérêts personnels ou de consacrer plus de temps à leur famille. Dans le cas des employées ayant des enfants, l'employeur peut investir dans leur avenir professionnel en leur fournissant un congé de maternité payé, ainsi que des options de services de garde améliorées (et plus nombreuses) pour alléger leurs préoccupations financières tout en leur permettant d'avoir plus de temps et d'énergie à consacrer à leur carrière⁸.

YES, un organisme à but non lucratif voué au développement des affaires et de la carrière des Québécoises et Québécois, a mis sur pied ces sept dernières années divers projets de

promotion du recrutement, de la fidélisation et de l'avancement des femmes dans les STIM. Son projet Women in Tech (Les femmes en technologie), mené de 2012 à 2015, avait pour objectif d'appuyer et d'encourager les femmes désirant percer dans le secteur technologique, grâce à des séances d'encadrement, des mentorats, des stages et des ateliers.

Un nouveau projet de YES, *Systemic Change: Advancing Women in STEM* (Le changement systémique : faire progresser les femmes dans les STIM), vise à améliorer la compréhension des systèmes et des pratiques institutionnelles qui touchent les femmes dans les STIM; à donner accès à des stratégies, des outils et des cadres favorisant la promotion et la fidélisation des femmes dans les STIM; et à promouvoir des initiatives internes de soutien aux employées et d'influence sur leurs organisations pour contrer le préjugé sexiste.

Ce ne sont que deux des projets par lesquels YES tente de mobiliser les employés et les cadres à l'échelle du pays pour améliorer la situation des femmes dans les STIM.

Why women give STEM companies a competitive edge

A diverse workplace reflects the diverse world we live in. Women are themselves customers and bring a unique and diverse perspective to any project – not to mention that female-led teams tend to have greater precision and attention to detail, which means that they are more efficient and productive. In short, hiring and retaining women in STEM is not only the right thing to do, but the smart thing to do, for all Canadian STEM companies.⁹

Pourquoi les femmes donnent un avantage concurrentiel aux entreprises des STIM

Un milieu de travail diversifié est le reflet du monde diversifié dans lequel nous vivons. Les femmes sont elles-mêmes des clientes qui ont une perspective unique et diversifiée sur tout projet – sans mentionner que les équipes dirigées par des femmes tendent à être plus précises et à manifester un plus grand souci du détail, ce qui signifie qu'elles sont plus efficaces et plus productives. En résumé, embaucher et fidéliser les femmes dans les STIM est non seulement la bonne chose à faire, mais la chose intelligente à faire, pour toutes les entreprises canadiennes évoluant dans ce domaine⁹.

AUTHOR BIO

Rachel Morgenstern-Clarren, Freelance Writer with YES Montreal, is a writer, translator and editor. She earned her BA from the University of Michigan and her MFA from Columbia University. Originally from Cleveland, Ohio, she is now based out of Montreal.

BIOGRAPHIE DE L'AUTEURE

Auteure, traductrice et rédactrice, **Rachel Morgenstern-Clarren** est titulaire d'un baccalauréat ès arts de l'Université du Michigan et d'une maîtrise en études littéraires de l'Université Columbia. Originaire de Cleveland, en Ohio, elle vit à Montréal. Rédacteur Pigiste avec YES Montreal.

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CASE STUDY

In this recurring *Careering* feature, career professionals share their real-life solutions to common problems in the field.

Pat is currently doing Maritime surveillance with PAL Aerospace.

Bridging the gap through profession-specific mentor matches

Ritu Ganju

Successfully matching clients with mentors requires a lot of preparation, but the outcome can make it all worthwhile

or close to eight years I have worked with immigrants, matching them with professional mentors in their field of work. I have seen magical partnerships form, resulting in life-long friendships. The newcomer mentees I work with arrive with unique skill sets, tremendous hope, courage and aspirations to build a successful career in Canada. In most cases, they also have extensive international work experience.

Pat's story

The memory of one wonderful mentor-mentee relationship remains very close to my heart. During my first year of making mentor matches, I met Pat, who arrived in Halifax as a government-assisted refugee. He dreamed of becoming a pilot. It would have been quite a daunting task to embark on this challenging career if not for the support he received from the local settlement organization, his community and his mentor. When I first met with him during my intake session, he said, "It was during my first flight I took from Congo that I dreamed of becoming a pilot." Very innocently, he inquired if he could become a pilot in Canada and if I could match him with a mentor who could provide him with guidance and support toward achieving this goal.

Successfully matching clients with mentors requires a lot of preparation on the program co-ordinator's part. Ensuring a beneficial match between mentors and mentees is key to the success of the program. A match is based on aligning the skills of the mentor, their availability and their passion to get involved with the needs and expectations of the mentee. Getting to know your mentors and mentees can help in creating a successful and a productive match. The co-ordinator should also take the time to ensure mentees are prepared and have appropriate expectations of the mentoring relationship.

Image courtesy of Par

I wanted Pat to go through the intake orientation and understand that a successful mentoring partnership would require him to drive the mentoring relationship and initiate regular contact with his mentor. I explained he would need to respect his mentor's time and be available to meet his mentor with planned agenda items at a place and time convenient for both of them. The key to establishing a successful mentoring relationship would include creating a relationship of trust and honesty, establishing short- and long-term goals, and having open communications with the mentor at all times.

While I worked to find a mentorship match, I recommended Pat continue with his research on licensing requirements, complete his education and take up a survival job. During our intake session, I emphasized that his mentor would not get him a job or a pilot's license.

Finding an ideal match

I did not have a pilot in my mentor rolodex. Recruiting a mentor for Pat would require deeper considerations and some extra efforts.

A mentor's job is to serve as a positive role model. Mentors build a relationship with their mentee by planning and participating in activities with them, helping build their self-esteem and motivation, and assisting them in setting goals and working toward them.

In Pat's case, the mentor needed to go an extra mile and understand his background and story. Arriving as a refugee can be quite traumatic. I wanted to match Pat with someone who would be empathetic, dependable and open-minded, as well as honest about challenges and how to overcome them. The mentor needed to support Pat's larger vision of success and help broaden his professional network.

So, I was extremely fortunate to meet Alan, Pat's eventual mentor, during a networking event. Professional pilots are extremely busy andhavelimited time to volunteer due to their extensive flying hours and busy schedules. As luck would have it, Alan had just retired from flying and was looking forward to volunteering and giving back to the community. Alan seemed to be a perfect fit because of his gentle and kind personality. I knew he would be a perfect role model for

A mentor's job is to serve as a positive role model. Mentors build a relationship with their mentee by planning and participating in activities with them, helping build their self-esteem and motivation, and assisting them in setting goals and working toward them.

Pat. I discussed Pat's background and expectations with Alan and he was more than happy to become his mentor.

In a short time, I was able to fix the first introductory meeting between the two, where goals and expectations were discussed. At the end of the meeting, Alan invited Pat to join him in servicing his personal aircraft over the weekend. I could see the excitement in Pat's eyes – there was no looking back after that. Alan had taken Pat under his wings! The next time I followed up with them, I received photographs of them flying

> together. They even invited me to fly with them a couple of times, but I never gathered enough courage to go in the air.

The magic of mentorship

All the effort that goes into pairing your client with a mentor is worth it, especially when the outcome is magical. This happens when both the mentor and the mentee are equally involved and invested in the relationship. In Pat and Alan's situation, the pair shared a common dream – for the mentee to achieve and the mentor to enable achievement and success.

Pat and his mentor worked together, flew together and celebrated together. At every stage of Pat's success, his mentor supported him. Whether it was providing guidance through the admission process to flying schools or assisting with access

to technical materials, his mentor was always by his side.

Today, Pat is a licensed pilot and teaches people to fly. I look forward to one day flying on a commercial aircraft he captains.

Pat shared what the mentorship relationship meant to him in an email:

Alan helped me in guiding me through my training. He advised me on what route to follow in achieving my childhood dream. After completing my commercial pilot license, Alan advised me to go through instructing. When I completed the course, I was hopeless, as I couldn't find a job. Alan managed to get me contacts for the director of flight operations at the flight college. I sent my resume and lucky enough I was hired as a flight instructor at what happens to be one of the best flight schools in Canada."

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AUTHOR BIO

Ritu Ganju works as Coordinator, Professional Mentorship Program and Team Lead for the Business and Workforce Integration at Immigrant Services Association of Nova Scotia (ISANS). She has over 20 years of experience in the field of education and career development. She constantly seeks creative ways to foster a dynamic learning environment for mentees and integrate immigrants into their work environment. Ritu received a nomination as one of The Top 25 Immigrants in the Maritimes 2018.



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Information and communication technologies (ICT): The workforce today and in 2021

Who works in the sector?



account for only 24% of the ICT workforce



15-25 make up 4.4.% of the total ICT workforce



55-66 make up

5 technologies that are transforming the digital economy



augmented reality



3D Printing

-352

Blockchain

professionals working in the Canadian digital economy



Artificial intelligence

What the future will look like

By 2021 there is expected to be a **demand** for **216,000** digitally skilled workers Ontario, BC and Quebec will need **the most** ICT workers by 2021 ICTC forecasts that, by 2021, the employment in Canada's digital economy will reach





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It is widely assumed that sciences offer students a 'safe' future. While there are many opportunities available, expectations do not always align with reality

On présume généralement que les sciences assurent aux étudiants un avenir « sûr ». Même si de nombreuses occasions s'offrent à eux, les attentes ne correspondent pas toujours à la réalité



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hey are passionate about science: they read, examine, experiment. They are high achievers in mathematics, chemistry and physics. They dream of contributing to the improvement of health and the quality of life on a global scale. They are hopeful for the future: careers in science offer good, stable, well-paid jobs, don't they?

Although this field offers many opportunities, the job market is not always favourable to graduates. The unemployment rate for graduate students is amongst the highest, compared to applied sciences, humanities, letters, etc.¹ So why is it still so widespread that sciences offer a "safe" future?

There are important elements to know about careers in science and research. The goal here is not to praise nor to criticize taking up a career in science, it is to present the essential information to better accompany teens and young adults who are considering a career in the scientific field.

Is sont passionnés de sciences: ils lisent, visionnent, expérimentent. Ils sont très performants en mathématiques, en chimie et en physique. Ils rêvent de contribuer à un effort mondial pour améliorer la santé et de la qualité de la vie des populations. Ils ont confiance en l'avenir : les carrières scientifiques offrent de bons emplois, stables et bien rémunérés, n'est-ce pas?

Bien que ce domaine offre de nombreuses possibilités, le marché du travail n'est pas toujours favorable. Le taux de chômage des étudiants diplômés en « sciences pures » est malheureusement parmi les plus élevés, comparé aux sciences appliquées, aux sciences humaines, aux lettres, etc¹. Alors pourquoi est-il encore si répandu que les sciences offrent un avenir « sécuritaire »?

Il y a des éléments importants à savoir sur les carrières en sciences et en recherche. L'objectif ici n'est pas de les louanger ou les critiquer, mais de présenter les informations essentielles pour bien accompagner les jeunes qui envisagent une carrière dans le domaine scientifique.

Employment statistics of recent graduates

As in any career-orientation process, employment statistics indicate the ease (or not) that graduates of a specific field have entering into the job market.

In the field of science, data from statistical surveys are often very encouraging. On the other hand, some must be interpreted with caution.

- In disciplines with few students (e.g. physics), the very small sample size may lead us to question the reliability of the unemployment rate.²
- 73% of civil engineering graduates with a bachelor's degree have a full-time job related to their training, compared with 5.3% in physics.³
- A question must be pondered: have people pursuing a master's degree pursued their studies by choice or for lack of finding a job?
- There may even be different realities within the same discipline (e.g. chemistry) depending on the specialization chosen by the graduates (e.g. organic chemistry, materials chemistry or theoretical chemistry). Why? Statistics on training programs only show the average of their category. The difficulties of professional integration encountered by graduates of certain specializations are thus camouflaged.
- Employee compensation, regional employment opportunities and changes in the employment market may also explain why some science graduates (in physics, chemistry and math) have a harder time entering the job market than science graduates in engineering or applied sciences.⁴

Les statistiques sur l'emploi des nouveaux diplômés

Les statistiques d'emploi indiquent la facilité (ou non) avec laquelle les diplômés d'un domaine spécifique entrent sur le marché du travail.

En sciences, les données des enquêtes statistiques sont souvent très encourageantes. Par contre, certaines doivent être interprétées avec prudence.

- Dans les disciplines accueillant peu d'étudiants (ex. : sciences physiques), la très petite taille de l'échantillon doit nous interroger sur la fiabilité du taux de chômage².
- 73% des bacheliers en génie civil occupent un emploi à temps plein lié à leur formation, contre 5,3% en sciences physiques³.
- Les personnes qui poursuivent des études de maîtrise le font-elles par choix ou faute d'avoir trouvé un emploi?
- Il peut même y avoir différentes réalités au sein d'une même discipline (ex. : la chimie) en fonction de la spécialisation choisie par les diplômés (ex. : chimie organique, chimie des matériaux, chimie analytique, etc.). Pourquoi? Les statistiques sur les programmes de formation ne montrent que la moyenne de leur catégorie (ici, la chimie). Les difficultés d'intégration professionnelle rencontrées par les diplômés de certaines spécialisations sont ainsi camouflées.

La rémunération des employés, les perspectives d'emploi par région et l'évolution du marché du travail peuvent également expliquer pourquoi certains diplômés en sciences (physique, chimie, mathématiques) ont plus de difficulté à intégrer le marché du travail que les diplômés en génie ou en sciences appliquées⁴.

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BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

Evaluating employment data with a critical eye

Employment statistics are a treasure chest of valuable data, but are insufficient in making an informed career choice. It is therefore essential to consult other sources, but it is important to be aware of their limitations and know how to validate the information they provide.

First, the data provided by some institutions may seem reliable, but their interests must be weighed. Each student is a potential source of income for universities, so some may present their data

73% of civil engineering

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to their best advantage to attract a maximum number of students. The same is true for professional groups, which must support their industry by meeting companies' ever-growing workforce needs. Therefore, one should not hesitate to cross-check the employment statistics conveyed in certain advertisements.

Newspaper articles are another source of potential information, but there is also a need to be critical of them. For example, one should be wary of articles that cite only one source of information, only quote industry representatives or use statistics in isolation.

In some government information sources, which are otherwise quite neutral, the employment outlook indicators are rather vague (e.g. good,

acceptable, weak). Other sources are very useful for taking the pulse of a field (e.g. job offers, student associations, recent graduates, mentors, etc.), but the information collected is subjective; it may not be representative of the entire field.

Overall, each source of information has its advantages and disadvantages. That's why guidance counsellors and career professionals are the best sources to help jobseekers make an informed decision.

3 things to know about graduate studies and research

Have a client who wants to do a master's degree or a doctorate in science, or who is interested in research? Here are some things you need to know.

- In some areas, a graduate degree is not conditional to employment.
 For the employer, a doctorate is not a guarantee of resourcefulness or ability to innovate.
- Research is an extremely competitive field, with a global span. Which researcher will publish his or her results first? Many scientists work evenings and weekends to stay in the race.
- Researchers are accountable to the organization that hires them or funds their research. Their position may be up for grabs if they do not reach the expected goals.

Évaluer les statistiques d'emploi avec un œil critique

Les statistiques d'emploi constituent un trésor de données précieuses, mais ne permettent pas de faire un choix de carrière éclairé. Il est donc essentiel de consulter d'autres sources, mais il est important de connaître leurs limites et de savoir valider les informations fournies.

Premièrement, les données fournies par certaines institutions peuvent sembler fiables, mais il faut garder en tête que certaines sont en conflit

> d'intérêts. En effet, chaque étudiant est une source de revenus potentielle pour les universités. Certaines peuvent donc utiliser les données à leur avantage pour attirer un maximum d'étudiants. Même chose pour les regroupements professionnels, qui doivent soutenir leur industrie en comblant les besoins de main d'œuvre des entreprises. Il ne faut donc pas hésiter à contre-vérifier les statistiques d'emploi communiquées dans certaines publicités.

> Les articles de journaux sont une autre source d'information potentielle, mais il faut également faire preuve d'esprit critique. Par exemple, il faut se méfier des articles qui ne citent qu'une source d'information, qui ne citent que des représentants de l'industrie ou qui utilisent une statistique de manière isolée.

> Dans certaines sources d'information gouvernementales, qui sont par ailleurs tout

à fait neutres, les indicateurs de perspectives d'emploi sont plutôt vagues (ex. : bonnes, acceptables, faibles). D'autres sources sont très utiles pour prendre le pouls d'un domaine (offres d'emploi, associations étudiantes, nouveaux diplômés, mentors, etc.), mais les informations recueillies sont subjectives: elles risquent de ne pas être représentatives de l'ensemble du domaine.

Bref, chaque source d'informations a ses avantages et ses inconvénients. C'est pourquoi les professionnels de l'orientation sont une excellente source à consulter pour prendre une décision éclairée.

3 choses à savoir sur les études supérieures et la recherche

Vous connaissez un étudiant qui souhaite faire une maîtrise ou un doctorat, ou qui s'intéresse à la recherche? Voici certaines choses que vous devez savoir.

- Dans certains domaines, un diplôme d'études supérieures n'est pas une condition d'embauche. Pour l'employeur, un doctorat n'est pas une garantie de débrouillardise ni de capacité à innover.
- La recherche est un domaine extrêmement compétitif, et ce, à l'échelle mondiale. Quel chercheur publiera ses résultats en premier? Plusieurs d'entre eux travaillent les soirs et les fins de semaine pour rester dans la course.
- Les chercheurs doivent rendre des comptes à l'organisation qui les embauche ou qui finance leurs recherches, sans quoi leur poste pourrait être remis en question.

Becoming a scientific researcher

Only 20% of doctoral graduates are employed as full-time university professors.^{5,6} Students who are interested in this type of career should prepare by:

- Reading scientific articles
- Acquiring early experience such as internships
- Differentiating themselves from other students in their class (by having good academic results, which are the main selection criterion for the award of summer research internships and master's scholarships)
- Approaching researchers they wish to have as supervisors early on
- Doing a post-doctoral internship
- Targeting the best laboratories, which welcome the most eminent researchers and have more resources to finance large projects
- Applying to scholarships for research funding

In the end, the best choices are those made wisely, by knowing and acknowledging the facts, and respecting personal values and interests.

This article was inspired by the book Les carrières en sciences – Astuces pour éviter les pièges (2017), by Dr Maxime Bergeron.

AUTHOR BIO

Lucie Demers is guidance counsellor and editorial director at Septembre éditeur, a publishing house specialized in career guidance content. She has contributed to the development of several books and digital tools over the last seven years.

Devenir chercheur

Seulement 20% des titulaires de doctorat obtiennent un emploi de chercheur universitaire^{5,6}. Voici comment les étudiants intéressés par ce type de carrière peuvent s'y préparer.

- Lire des articles scientifiques;
- Acquérir une première expérience (stages)
- Se différencier des autres étudiants de leur classe en obtenant de bons résultats scolaires, qui sont le principal critère de sélection pour l'octroi d'un stage de recherche d'été et d'une bourse de maîtrise
- Approchant rapidement les chercheurs qu'ils souhaitent avoir comme superviseurs
- Faire un stage post-doctoral
- Cibler les laboratoires qui accueillent les chercheurs les plus éminents.
 Ce sont eux qui ont plus de facilité à financer de grands projets;
- Appliquer aux bourses pour le financement de la recherche

Au final, les meilleurs choix sont ceux qui sont faits avec sagesse, en toute connaissance de cause et en respectant ses valeurs et ses intérêts.

Cet article est inspiré du livre Les carrières en sciences - Astuces pour éviter les pièges (2017), *de Maxime Bergeron*.

BIOGRAPHIE DE L'AUTEURE

Lucie Demers est conseillère d'orientation et directrice éditoriale chez Septembre éditeur, une maison d'édition spécialisée dans les contenus liés à l'orientation et à la carrière. Depuis 2012, elle a contribué au développement de plusieurs livres et outils numériques.

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26 Careering / Winter 2019



CERIC launches new book on how career theory informs practice

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Career Theories and Models at Work: Ideas for Practice is a collection of contemporary and emerging career development theories and models that aims to inform the practice of career development professionals around the globe. The book was published by CERIC and edited by Dr Nancy Arthur, Dr Roberta Neault and Dr Mary McMahon. It has 43 chapters on the theories and models that define the practice of career development today, with contributors from four continents and nine countries.

Career Theories and Models at Work provides practitioners with a tangible resource they can use to develop theory-informed interventions. It is also anticipated to be used as a text for undergraduate and graduate courses in career counselling.

The publication is available in print and e-book via Amazon and Chapters.Indigo.

Learn more about Career Theories and Models at Work at ceric.ca/theories

A report from the Higher Education Quality Council of Ontario (HEQCO)

A report from the Higher Education Quality Council of Ontario (HEQCO) observes that student demand is rising for work-integrated learning (WIL) experiences, including co-op, internships, applied research projects, field experience and service learning. Many options for students are oversubscribed.

However, certain students still face barriers to participation in WIL. The report argues more could be done to increase the participation of first-generation, Indigenous and other minority students in WIL programs. It suggests one way to increase participation is to have faculty champions of WIL opportunities to promote them to students. Managing student expectations through consistent messaging is also important, HEQCO says. The report also notes that institutions must be prepared to help students with time and financial pressures they may face when taking part in a WIL program.



NEADS releases report series examining experiences of graduate students with disabilities

The National Educational Association of Disabled Students (NEADS) released several reports this past fall as part of the *Landscape of Accessibility and Accommodation for Post-Secondary Students with Disabilities in Canada* national study, which was supported by CERIC and other organizations. The reports are based on a detailed analysis of the 2016 Canadian Graduate and Professional Student Survey. They include:

- A Snapshot of the Experiences of Graduate Students With Disabilities Who Identify as Aboriginal
- Graduate Students With and Without Disabilities: A Comparison
- Comparison of STEM and Non-STEM Graduate Students With Disabilities

Some notable findings from the reports:

- Of the 2,327 participants who identified as having a disability, 189 self-identified as Aboriginal. This equates to 8% of the sample of students with disabilities.
- In the comparison of graduate students, the most common type of disability was mental health (43%); the least common was autism (3%).
- Several demographic differences were found among graduate students with disabilities in STEM and non-STEM disciplines in terms of: age (students in non-STEM were typically older); marital status (more students in non-STEM were married); and number of children (more students in non-STEM had children).

Read the reports at *neads.ca*

New CareerWise, OrientAction websites offer modern career development content and learning

At the end of November, CERIC replaced ContactPoint with the new CareerWise website, *Your source for career development news and views*, and also launched a brand-new OrientAction, its French sister site. The new sites reflect the evolving ways that people find and interact with information online. They feature relevant and thought-provoking articles on education, skills, counselling, employment and the workforce from a variety of publications. CareerWise and OrientAction also feature original perspectives from experts and community voices as well as round-ups of popular resources and events.

The new websites site build on the popularity of CERIC's weekly content curation newsletters (*CareerWise Weekly* and *OrientAction En bref*), which were given a refreshed look.



Visit *careerwise.ceric.ca* and *orientaction.ceric.ca* to learn about the latest in career development, sign up for our newsletters or contribute a blog.

OECD report reveals findings on Indigenous employment in Canada

The report, *Indigenous Employment and Skills Strategies in Canada*, finds Indigenous underemployment persists, with Indigenous peoples still facing numerous barriers. The report states that Indigenous people are more likely to be in lower-paying jobs such as teaching, retail or social work. They are significantly under-represented in management, business and finance.

However, the OECD report also points to some positive changes. It finds skills-training programs are most successful when they are delivered and managed by Indigenous people for Indigenous people. The report also notes several municipalities have strategic policy frameworks targeted to local Indigenous populations, with city mayors meeting with communities to help build trust.



Read the report at oecd.org/canada

TD Ready Challenge awards grants to organizations preparing for the future of work

Ten organizations were awarded \$1 million grants through the TD Ready Challenge. The grants were given to organizations offering solutions in the areas of change identified by the Ready Commitment: Financial Security, Vibrant Planet, Connected Communities and Better Health. Among the winners:

- ACCES Employment providing immigrant women with training, employer connections and experiential learning to help secure and retain competitive employment in programming and cybersecurity
- Woodgreen Community Services helping mid-career participants achieve financial stability and sustainable employment through its accelerator program
- Canada Learning Code offering hands-on, accessible learning for mid-career individuals to increase their digital literacy and technological knowledge in order to thrive in a rapidly changing job market

View the other winners at *td.com/readychallenge*

Got med school hopefuls? Special categories can help

Christine Fader

From Indigenous students to military applicants, there are several special application categories related to identity, descent and status



oyou have students who are interested in medical school in Canada? Many advisors are excited to learn that there are special application categories that can benefit particular demographics. These include categories related to identity or descent (e.g. applicants of Indigenous descent) as well as categories related to status (e.g. graduate student applicants).

There are two general types of categories that your students may need to consider.

Optional categories

Medical schools are actively trying to address critical shortages of physicians from under-represented groups, in part to help address the health-care needs of these populations in Canada. Because of this, they have created optional "special categories" for these applicants and sometimes reserve spots for a few candidates from this pool.

It is a personal decision whether your students decide to apply under this category. They may wish to think through the elements of this decision before they apply or seek your advice on how to pursue additional documentation. In my experience as a career counsellor at Queen's University and in private practice, many students also need reminding that applying under a special category does not mean they are "cheating" the system somehow or being given a free pass; they must still meet the basic criteria for medical school. ©iStock/Varijanta

Currently, your students may decide to apply under the following optional categories as:

- **1.** An Indigenous applicant or
- 2. An applicant of African descent (most medical schools call this the Black applicant category).

In addition to the usual application materials, a student I worked with who identified as an Indigenous applicant also submitted a letter in which he cited his ancestry and specific affiliation, requested consideration under the special category, provided biographical information and described his reasons for wanting to become a physician. He also needed a letter of support from an individual representing his Indigenous community. A student I worked with who was applying under the Black applicant category (he didn't immediately identify as "of African descent," since his family hailed from Jamaica) wrote a compelling personal essay highlighting why he had chosen to apply as a special-category candidate, which was then reviewed by faculty of African descent at the universities to which he had applied.

Compulsory categories

If your student meets one of these criteria, they must apply under this category and submit any required supplementary documentation. These compulsory categories include:

- 1. Graduate students
- 2. Students pursuing combined programs
- 3. International students
- 4. Military applicants

Graduate students

I have worked with applicants who were PhD graduates from Canada and elsewhere, master's students in research programs and students completing course-based graduate degrees. Required supplementary documentation usually includes a CV, additional letters of reference (e.g. from a graduate supervisor or program director) and a letter confirming expected completion date of the degree, if they are currently enrolled in a graduate program. One STEM graduate I worked with went on to complete a master's degree in a professional program. She had unsuccessfully applied to medical school after her undergraduate degree but was accepted after her master's. She attributed this not to additional GPA benefit (most medical schools do not afford graduate students much, if any, GPA boost), but rather to the unique scrutiny given to graduate students.

Students pursuing combined programs

Some programs integrate professional or scientific training with medical school. Examples include: MD/PhD and MD/MSc programs, MD/MBA and MD/MPH programs. Some programs are formally combined, while others are not.

Students need to meet the minimum criteria for each program separately. They also submit documents that may include a letter of intent, information about personal or research experience, an academic CV and additional letters of reference. I worked with a student who successfully applied to both law and medicine programs and was "braiding" them (two years in law school, then two years in medical school, etc.). He hoped to one day become a forensics specialist.

International students

These students face significant challenges with medical school admissions since there are often no spots or spots numbering only in the single digits that are allocated for international students. Admission for them is not impossible but realistically, it is incredibly competitive and success can be limited. The University of Toronto is one of the few schools that currently accepts international students, but you should encourage your students to check updates on admissions at each school during their year of application. You may also discuss foreign medical schools with these students (a topic for a whole other article!).

Military applicants

You may have regular forces (full-time) or reservists (part-time) who are applying under this category. If the student is currently employed (and wishes to remain) as a member of the Canadian Armed Forces, they need to check with their commanding officer and possibly their military career manager about pursuing a medical degree. These applicants are only accepted to medical school when the Canadian Armed Forces decides it needs more doctors. However, I know of people who have retired from or left the military to apply to medical school, which means they would no longer have to be considered as part of this category.

I hope that knowing more about these special categories will help you in your daily work, as you encounter students thinking about medical school.

Learn more:

The Ontario Medical

School Application Service ouac.on.ca/omsas The Association of Faculties of Medicine of Canada afmc.ca



AUTHOR BIO

Christine Fader *is the author of* Just What the Doctor Ordered: The Insider's Guide to Getting into Medical School in Canada (*Brush Education*, *September 2018*) and was a career counsellor at Queen's University from 1998-2018. Fader was a medical school application reader and interviewer for eight years, a physician recruiter and is currently an instructor at Queen's for fourth-year medical students applying to residency. Meet her at **christinefader.com**

30 Careering / Winter 2019

Principles in Action

Embracing external influences to help guide career exploration



Photo courtesy of Gloria Welton

With a goal of bringing greater clarity and consistency to our national conversations about career development, CERIC developed a set of **"Guiding Principles of Career Development"** that have been enthusiastically embraced across Canada. These eight Guiding Principles are intended as a starting point to inform discussions with clients, employers, funders, policymakers and families.

Each issue of *Careering* features a Guiding Principle "in action," exploring how a career professional is applying a principle in practice.

nowing your expectations and values, being inquisitive, attentive and willing to talk with people who can help lead you along your career-planning path is essential. But we can't do this in a silo. We need each other to get the support and information required to navigate our career choices.

As a career development professional (CDP), I know that career planners have many people in their lives to help inform their career decisions. So, whether figuring out how to make sense of labour market information (LMI), working on experiential learning partnerships or evaluating a career planner/jobseekers' motivations, assessing the different influences in their lives is important.

Guiding Principle

Career development entails determining interests, beliefs, values, skills and competencies – and connecting those with market needs.

ceric.ca/principles

Take Christie Hall, who worked in my office for 12 weeks on a preceptorship (a placement in a clinical or community setting to teach nursing students the complexities of the practice). She is a fourth-year nursing student at the University of Prince Edward Island. Although Christie comes from

a family of many engineers, an experience with the health-care system sparked her interest in nursing at a young age.

"Ever since I was young, I wanted to work in a health setting," says Christie. "It all started when my youngest sister needed to go to the IWK Health Centre in Nova Scotia for various health problems. I went with her to her appointments and procedures, and it turned out to be an opportunity to have an inside look at health care."

How the personal affects career plans

Some career advice is given to jobseekers directly, with parents or teachers suggesting career paths they think would be a good fit. But other influences are subtler, coming from a personal interaction with an industry or career path.

However, Christie says that if her parents hadn't been supportive of her choosing her own path, things might have turned out differently.

It's important for career professionals to understand these influences when working with clients to help them set goals and decide next

steps. They can also provide crucial context to help determine if their vision of an industry matches the reality.

Connecting to context

Much of the information jobseekers receive about the labour market is filtered through the parties highlighted in the Guiding Principle. However, this information may be based on anecdotes or reports coming through the news media.

With so many different factors affecting a career decision, one thing career professionals can do to offer some clarity is to share up-to-date, relevant LMI about the fields their clients are considering.

For 20 years, I have owned and managed a publication on Prince Edward Island called *The Employment Journey on PEI*, providing grassroots labour market information (LMI) to jobseekers, employers, career professionals and parents. The secret to the publication's success is the same magic that jobseekers need as they explore their options: partnerships.

Career development professionals must pair their own labour market information with the other advice jobseekers are receiving. A chemistry teacher might advise a star student to pursue an academic path in the sciences, for example. Or a parent might suggest their arts undergrad apply for law school. It's important for career practitioners and their clients to take into consideration the opinions of those who know them best -

they might highlight certain attributes the client did not realize they possessed. However, without accurate LMI, this guidance could lead people down unsustainable paths.

LMI is all around us, but we must be willing to dig for it and use the people in our life and in our community as a source of this information. Jobseekers also need to decide how this information relates to their career development. One way CDPs can facilitate that is by connecting clients with experiential learning opportunities.

Getting real-world exposure

As noted in the Guiding Principle, workplace managers and the greater community – including businesses and organizations – can also have a

Whether figuring out how to make sense of labour market information (LMI), working on experiential learning partnerships or evaluating a career planner/jobseekers' motivations, assessing the different influences in their lives is important.

strong influence on career decisions. Experiential learning is one of the ways clients get exposed to these influences. This learning-by-doing gives us a closer, more realistic view of work environments and occupations. It might take place during co-op placements, internships, preceptorships, mentorship or volunteering.

As career professionals, it is our role to not only connect clients to these types of experiences but to ensure they're equipped with the knowledge they need to succeed in them and apply what they learn in their career management.

Christie's story is a great example of the value of hands-on experiences. To confirm her interest in nursing, she decided to volunteer at the

Queen Elizabeth Hospital in Charlottetown. Last year, she started working part-time at a community care home. This fall, the Career Development Association of PEI provided her with a 12-week preceptorship, during which she researched the health implications of a new program on seniors and people with disabilities. These experiences deepened her understanding of the nursing profession.

Career services have an important role to play in connecting students to experiential learning. Recognizing this, the University of Prince Edward Island has launched a new Professionalization Badge for students who want to develop and demonstrate their professional competencies.

"UPEI is helping students develop and communicate their skills," says Tara Corman, a Student Advisor for the Experiential Education and Work-Integrated Learning

office. "To earn their badges, students focus on labour market literacy, communication skills and professional skills."

This initiative, which embraces the influences managers, labour market information and the broader community can have on students, may serve as a useful model for other post-secondary institutions.

Closing thoughts

With all the different influences jobseekers face, it can be challenging to decide on a suitable path. But by viewing educators, family, peers, managers and the greater community as potential resources, and helping jobseekers make sense of their advice and experiences with LMI, career professionals can help clients take steps toward a successful and rewarding career path.

AUTHOR BIO

Gloria Welton owns and manages The Employment Journey on PEI. Prior to her entrepreneurial endeavors, she was a Career Exploration Co-ordinator for Holland College and New Brunswick Community College in Saint John. She started in the career development field in 1986. She is amazed at the many opportunities that have come her way, providing enriched experiences working to help others navigate the world of career planning.

CLIENT SIDE In this *Careering* feature, JODSEEKERS reflect on successes and struggles in their career development.



How I found my career fit in science

Scientist Leola Chow takes us on a journey through her career, from showcasing her work at elementary school science fairs to a career pivot into industrial research

love science because my career allows me to learn something new and exciting every day. As a scientist, I enjoy asking scientific questions and solving problems. I enjoy writing articles about my research findings, as it resembles putting together pieces of a puzzle.

Throughout my career, I have travelled to different national and international conferences to present my research and to learn about the latest advances in the field. This has allowed me to see many different parts of the world and meet some remarkable scientists across the globe. I find this part of my work very rewarding.

Early career influences

I was interested in science from a young age. Starting in elementary school, my favourite class was science and I enjoyed learning about different scientific concepts. I was naturally drawn to science topics and had teachers who made learning about science fun. I enjoyed participating in science fairs and school open houses, where I showcased my science projects and presented experiments for the public. At home, my parents consistently encouraged hard work and good work ethic throughout my childhood.

As I entered high school, genetics fascinated me and I was intrigued by how small molecules called DNA can encode our physical characteristics.

Getting exposure to the field

This passion grew as I entered the University of Alberta, where I completed my BSc and PhD in molecular genetics. I decided to pursue graduate school following the completion of a thesis research course in the last year of my undergraduate training.

The experience I got in the laboratory during that time exposed me to a career in research and allowed me to realize that graduate school was my next logical career step. During my PhD training, I studied developmental genetics using fruit flies as the model system.

Following my PhD degree, I decided to pursue post-doctoral training as I still needed more I was an executive member for WISER (Women in Science Engineering and Research), where I liaised with different research organizations and funding agencies to organize networking events to promote women in science, engineering and research.

research training to position myself as a competitive candidate to become a scientist. Therefore, I applied and was awarded a Canadian Blood Services (CBS) post-doctoral fellowship to study a bleeding disorder known as Immune Thrombocytopenia Purpura. Afterward, I began my research associate position at the University of Manitoba studying allergic asthma and rheumatoid arthritis. There, I gained translational research experience, which is more applicable to the study of human disease, and it allowed me to switch from an



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academic to an industrial position at the Centre for Drug Research and Development (CDRD), where I served as an associate scientist. This was the right path for me, as I enjoy the structure that industrial research provides. I appreciate that research is more project- and goal-orientated in an industry setting, whereas research in academia is more exploratory in nature.

Sources of support

An important tool in helping me build my career in science has been networking, as a large number of jobs are not advertised. There are a lot of networking events for life sciences professionals across Canada. For example, I was an executive member for WISER (Women in Science Engineering and Research), where I liaised with different research organizations and funding agencies to organize networking events to promote women in science, engineering and research. Currently, I am a volunteer for the Society for Canadian Women in Science & Technology (SCWIST), where I network with like-minded individuals and where I hope to inspire girls and women to enter the science and technology field.

My role models and sources of support have always been my mom and sister, who were there for me at every success and failure. My sister is a constant source of genuine and helpful advice because she is also in the STEM field. I have found it extremely helpful to share my experience with someone who understands the ups and downs of my career from a female perspective.

For myself, I stay on track of my career path by setting goals, seeing every mistake as a learning process instead of failures, and surrounding myself with positive people who continue to encourage me to achieve my best.

AUTHOR BIO

Leola Chow currently lives in Vancouver, BC, and is looking for new opportunities in the drug development field.

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Canadian Payroll Association	18
Career Theories and Models at Work: Ideas for Practice	13
CareerWise / OrientAction	26
CERIC	21
College & Association of Respiratory Technologists of Alberta	3
Congress of Aboriginal Peoples	2
Dalhousie University	8
Life Strategies	37
Media Job Search Canada	35
Nipissing University	40
Nova Scotia Career Development Association	39
Petroleum Labour Market Information	30
Skills Compétences Canada	36
Study Across the Pond	
Thompson Rivers University	34
Times Change Women's Employment Services	37



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10 QUESTIONS

The Right Honourable **David Johnston** was Canada's 28th Governor General. During his mandate, he established the Rideau Hall Foundation (RHF), a registered charity that supports and amplifies the Office of the Governor General in its work to connect, honour and inspire Canadians. Today, he is actively involved as Chair of the RHF Board of Directors, and serves as an Executive Advisor at Deloitte.

Prior to his installation as governor general, Johnston was a professor of law for over 30 years, and served as President of the University of Waterloo from 1999 to 2010. He was President of the Association of Universities and Colleges of Canada and of the Conférence des recteurs et des principaux des universités du Québec.

He was the founding chair of the National Round Table on the Environment and the Economy and chaired the federal government's Information Highway Advisory Council. He has served on many provincial and federal task forces and committees, and has served on the boards of a number of public companies.

Johnston will be delivering the closing keynote address at CERIC's Cannexus conference on Wednesday, Jan. 30, 2019. Cannexus is a bilingual, national career development conference designed to promote the exchange of information and explore innovative approaches in the areas of career counselling and career development.

Describe why career development matters.

It matters to our country for the success of its future, it matters to our young people for theirs.

Which book are you reading right now?

A book called *Leadership: In Turbulent Times*, by Doris Kearns Goodwin. It biographies Abraham Lincoln, Theodore Roosevelt, Franklin D. Roosevelt and Lyndon B. Johnson.

What do you do to relax?

I like to take walks outside my farm with my wife, Sharon.

Name one thing you wouldn't be able to work without?

My team.

What activity do you usually turn to when procrastinating?

Exercise, it clears my mind and helps me focus.

What song do you listen to for inspiration?

Beethoven's 9th Symphony, 3rd movement.

Which word do you overuse?

"Alas" or "perhaps."

Who would you like to work with most?

Winston Churchill.

Which talent or superpower would you like to have?

The ability to see into the future, and to use this knowledge to help others.

What do you consider your greatest achievement?

Easy, my five daughters and 14 grandchildren.

The Right Honourable David Johnston runs with children during an official visit to Repulse Bay, Nunavut, on Aug. 18, 2011. Courtesy of the Rideau Hall Foundation

38 Careering / Winter 2019

Governor General in its work to actively involved as Chair of ive Advisor at Deloitte. professor of law for over 30 years, 99 to 2010. He was President of the e Conférence des recteurs et des vironment and the Economy and chaired . He has served on many provincial and

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