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Tech Founder Education

Backgrounds of 585 Founders from 335 Canadian Tech Companies







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A Profile of 585 Startup Founders Exhibit 1



Summary

"Founders of Canadian tech startups are highly educated - 95% of them hold a bachelor's degree." With the recognition of entrepreneurship playing a key role in economic growth and relevance for society, it has climbed up on the governments' priority lists and a growing interest in entrepreneurship education has been voiced by officials, universities and students. Before we take a closer look at the current state of entrepreneurship and innovation education at Canada's top universities, in this report, we present an analytical portrait of the educational background of some of Canada's leading entrepreneurs. Did they receive a university education, or were they college dropouts as typically portrayed in the media? What were the most popular bachelor's degrees in? How many founders went to graduate school? Did they have to be professors in order to realize their potential, or did they all need an MBA to make it in the startup world? Where were they educated? Is it typically men or women who start companies and how old are the founders?

To research the educational and demographic profile of entrepreneurs in Canada, we focused on the founders of Canada's private tech companies that had accumulated funding above five million dollars. We have examined 585 founders across 335 Canadian tech companies (Exhibit 1). The companies in the study have been broadly subdivided to belong to eight different industry sectors, five which are more technical, including computer hardware and services, electronics, mobile and telecommunication, internet, and software. The other three that are more distinct include the industrial, healthcare and consumer products and services sectors. Internet, mobile and telecommunication and healthcare were the most dominant sectors for startups in this study. Most of the companies have been founded after 2000, and only six before 1990, the oldest one having been established in 1908. The distribution of founding years and their corresponding industry sectors have been depicted in Exhibit 2.

Our findings at a glance

On the surface, the most apparent and overwhelmingly clear results in our study indicate that most tech entrepreneurs are highly educated (Exhibit 1). There are, however, significant demographic differences that have also been observed once area of educational specialization of these entrepreneurs and the industry sector of the startups have been taken into account.

- 95.4% of all startup founders have a bachelor's degree.
- At 34.9% of all undergraduate degrees, engineering was the most popular, followed by science at 21.4%.
- Founders with business, computer science or humanities and social sciences undergraduate degrees represented a smaller fraction, each at 12–14%.
- The vast majority, 79.8%, of founders received their undergraduate education at one of Canada's universities, top five being University of Waterloo, University of Toronto, University of British Columbia, Western University and McGill University.
- 50.9% of those with a bachelor's degree, also obtained a graduate degree. The most common graduate degree was a PhD.

- The second most prevalent graduate degree was an MBA, primarily taken by engineering and humanities, and social science students, whereas science students obtain very little business education.
- Scientists attain the highest level of education overall: 85% of undergraduate degree holders go to graduate school, while only 19% of business students get a second degree. 37% of founders with a science backgrounds hold professorships, while none of the founders with a business undergraduate degree hold academic positions.
- Only 5.8% of startup founders are women. Women with graduate degrees in humanities or social sciences make up 37% of that educational demographic – by far more than in any other sub-discipline.



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Undergraduate Degrees

The sensational stories about Bill Gates, Steve Jobs and Mark Zuckerberg being college dropouts and making it big in the entrepreneurial world tend to make a huge impact on how one perceives the profile of a successful tech startup founder. This misconception was allowed to develop as reporting and sensationalized stories often focus on statistical outliers and completely misrepresent the norm. We found out that the reality is quite different, and that the majority of company founders have a university degree – in our study, over 95% of them held an undergraduate degree. Similar findings were also reported by the Kauffman Foundation study (Wadhwa et al, 2008), indicating that 92% of US-born tech founders held bachelor's degrees.

Exhibit 3 details the breakdown of the undergraduate education of startup founders. Categorization of the various degrees was performed to match them into five distinct areas: business, engineering, computer science, humanities and social science, and science (Exhibit 3, top bar).

- A large fraction of founders, 33.3%, have an engineering degree, among which the most prevalent specialization was computer engineering.
- Science was the second most popular degree at 21.4%.
- Computer science, business and humanities and social science represented a very similar fraction of the population of founders in this data set (12–14% each).

We noted that founders have obtained their undergraduate degree from a wide collection of universities.

- University of Waterloo is by far overrepresented, having provided undergraduate education to 18.6% of the entrepreneurs in this study (Exhibit 3, middle bar graph).
- To round up the other top schools in terms of the numbers of founders that they have educated, the universities include the University of Toronto (UofT), University of British Columbia (UBC), Western University, McGill University and Queen's University – all of which are Canadian.

Across academic institutions, there are also marked differences in terms of the areas of undergraduate degrees that they have awarded to startup founders (Exhibit 3, bottom stacked bar graph). For example:

- Founders who did their undergraduate education at the University of Waterloo, almost exclusively obtained engineering and computer science degrees – similar trends were also observed at UofT and Queen's.
- The bulk of graduates from Western University obtained their degrees in business and humanities and social sciences.
- At McGill University, science and engineering students dominated.
- The most varied undergraduate population representation of all the categories was observed for UBC.

Undergraduate Education Exhibit 3



Eight industry sectors – computer hardware and services, electronics, mobile and telecommunication, internet, and software, industrial, healthcare, and consumer products and services, have been analyzed and contrasted based on the undergraduate degree topic of startup founders. The results are summarized in Exhibit 4. Engineering degrees are dominant in all but internet and healthcare sectors. The healthcare sector is distinct from the others, as it is characterized with an overwhelming fraction of founders that hold a science undergraduate degree. It is interesting to note that founders with a business degree were not represented in three of the industry sectors – computer hardware and services, electronics, and industrial, and represented a negligible minority in the healthcare sector.

Undergraduate Degree by Sector Exhibit 4



Graduate Degrees

The common belief of the dropout entrepreneur is shattered when one considers that out of the 95% that received an undergraduate degree, slightly more than 50% obtain more advanced degrees in graduate school (Exhibit 5). Out of all of the entrepreneurs that finished a science degree, 85% obtained a graduate degree as well, and just about 50% of engineers go for a second degree, while less than 20% of founders with a business undergraduate degree decide to obtain an advanced degree (Exhibit 5).



Graduate Degrees Exhibit 5 Overall, if one considers the topic of the graduate degree, science, at 32.8%, represents the largest fraction, closely followed by MBA degrees at 28.5% of all the advanced degrees obtained (Exhibit 6, top panel). While University of Waterloo was by far overrepresented on the undergraduate degree level, the University of Toronto also overwhelmingly leads the way in terms of the fraction of graduate degrees awarded to entrepreneurs at 20.1%, while UBC is in second place at 12.8% (Exhibit 6, middle panel).

The specialization of the different universities in terms of the topic of the degrees that they have awarded mirrors the ones on the undergraduate level pretty well, with maybe the dominant specializations becoming even more prominent in some cases (Exhibit 6, bottom panel). The University of Western Ontario, for example, produced many founders that graduate from a social science and humanities degree or a business degree on the undergraduate level, while their most popular graduate degree, by far, is the MBA. Additionally, at some of the top universities, such as UofT, McGill and UBC, the fraction of science degrees in graduate school has increased considerably at the expense of engineering and computer science degrees that have been awarded at the undergraduate level.

Of the top 20 academic institutions in terms of graduate degrees awarded, 18 are from Canada, while two of the top 10 schools in the US, Harvard and Stanford, occupy the 6th and the 11th place respectively. More than 50% of the graduate degrees awarded by Harvard are MBAs, making the Harvard Business School a popular choice for startup founders.



Graduate Degrees by Institution Exhibit 6

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In terms of the type of graduate degree that tech company founders possess, PhDs are the most numerous at 46%, followed by MBAs at 28.5%, and master's degrees at 21.9% (Exhibit 7, top panel).

Analysis of the fraction of PhDs and MScs across the different disciplines showed that within science, PhDs accounted for over 82% of the graduate degrees, whereas in the humanities and social sciences, graduate degrees were exclusively on the master's level (Exhibit 7, middle panel).

The variation of degree type awarded by university is also correlated to the degree topic – for example McGill, with a very large fraction of science graduate degrees (Exhibit 6 bottom panel), also has a large fraction of PhDs (Exhibit 7 bottom panel), in agreement that most science graduate degrees are in fact PhDs (Exhibit 7 middle panel).

Similarly Stanford University, a high caliber research school, has almost exclusively awarded graduate degrees on a PhD level, despite having an equal distribution of science, engineering and business graduate degrees present in the data set.



Breakdown of Graduate Degrees by Type, Topic and University Exhibit 7





Healthcare, industrial and electronics sectors boost the highest rate of founders with graduate degrees (Exhibit 8, top panel). The type of graduate degrees that have proven to be prevalent across the different industry sectors are summarized in Exhibit 8, bottom panel. Very high rates of PhDs were obtained in the industrial, healthcare and electronics sectors. Mobile and telecommunication, internet and consumer products and services sectors, have overall lower graduate degree rates, have only a small fraction of founders with PhD degrees, but have larger fractions of MBAs compared to other industries.

Educational Pathways

In the following analysis, we survey the educational path of founders from undergraduate to graduate school and examine the trends in graduate school attendance. Exhibit 9 illustrates those paths, with undergraduate degrees on the horizontal axis, and graduate degrees on the vertical, while the numbers of occurrences scale with circle sizes and are additionally colour coded, with highest numbers illustrated with darkest shades. The visualization indicates that if graduate degrees are pursued, undergraduate degrees are typically followed by graduate degrees in the same area, or by an MBA.

- 49% of engineer founders have a graduate degree: they tend to either get another engineering degree (21%) or an MBA (17%).
- Founders of companies with a bachelor's degree in business, across the board tend to not choose graduate school independent of the field (81%), only 7.7% of them even get an MBA.
- 85% of founders with a science undergrad have a graduate degree, and overwhelmingly go to graduate research programs or medical school (72%).
- What is interesting to note, is that scientists, hardly get any graduate business education, with a very small percentage of science founders getting an MBA. The numbers are very similar for computer science undergraduates, where only 7.7% get MBAs and 27% get a graduate degree in computer science.
- On the other hand, about a quarter of founders with a background in humanities and social sciences obtain an MBA, but do not tend to pursue graduate degrees in any other fields.



Educational Pathway of Startup Founders

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Where Have the Entrepreneurs Been Educated?

To determine if Canadian tech companies have been founded by home-grown talent or by successful professionals from abroad, an "undergrad by graduate" school matrix illustrating the geography of the two degrees has been constructed in Exhibit 10. In the table, the occurrences of the educational combinations have been summarized in numbers, while the size of the circle and its colour have been used to improve the visualization of the dominant trends, where larger circles and darker shades represent more probable outcomes. Both, on the undergraduate and graduate levels, the numbers are similar – 80% of undergraduate and 66% of the graduate degrees have been awarded in Canada.



Geographic Distribution of Academic Institutions Exhibit 10

Faculty Startups

Overall 9.2% of entrepreneurs in our study came from academia. But, 37.2% of founders with an educational background in science held academic positions (Exhibit 11). The results might not be surprising, considering our findings presented in Exhibit 5 showed that 85% of founders with a science education held graduate degrees, and most of those being PhDs, far outperforming any other group in terms of advanced degrees.



38.9% of founders of companies in the healthcare sector had faculty positions. We noted earlier that the majority of founders in the healthcare sector had an educational background in the sciences, and they also tend to have the highest rate of graduate school attendance and the highest rate of PhDs. From that perspective, the results are intercorrelated, and definitely puts science founders in the healthcare sector in a distinct category.



Academic Positions by Industry Sector Exhibit 12

Gender Statistics of Tech Entrepreneurs

Our study, which covers companies that have been founded from 1908 to 2017, reveals that the gender gap remains persistent among tech entrepreneurs in agreement with previous findings (Stephan and El-Ganainy, 2007; Murray and Graham, 2007; Teare, 2017). Only 5.8% of the founders of Canadian high-tech startups are women.

The highest fraction of female founders are represented in those groups with a bachelor's degree either in humanities and social science or in science, and the lowest in engineering and computer science (Exhibit 13). On the undergraduate level, women account for 66% of all non-STEM graduates, 59% of graduates from science streams, but only 23% graduate from engineering programs (Statistics Canada 2013). The under-representation of female startup founders is evident across all educational fields, but the compounding effect is most accentuated in fields where fewer women pursue their education. For example at the University of Waterloo in the computer engineering program, the most popular program in our data set here, in 2010 only 6.2% of the incoming class were women. By 2017, the numbers have risen to 20.4% (University of Waterloo 2017).



Gender of Founders by Degree Exhibit 13

Across the different industry sectors that we have studied, computer hardware and services, healthcare and industrial tend to have a percentage of founders above 8%, but the electronics sector for example has no founders that are women in our data set (Exhibit 14).



Gender of Founders by Industry Sector

Age Statistics of Tech Entrepreneurs

The idea that most successful entrepreneurs are in their early twenties when their startups are founded is not supported by our data. Projecting their age from when they obtained their bachelor's degrees, we found that the average age of startup founders was 35, depicted in the distribution graph in Exhibit 15.

- Scientists tend to be older than founders belonging to other educational backgrounds. Indeed, the numerical analysis indicates that scientists are on average 40.4 years old at the inception of their startup.
- Founders with a business background, tend to be the youngest, at 32.2 years.
- The oldest founders were in the healthcare sector at 43.4 years.
- The youngest founders by sector are in the consumer products and services at 29.5 years.



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Who Starts Companies Together?

Up to this point, we have been looking at startup founders as isolated individuals, not considering the fact, that as companies are created, multiple professionals often come together at the inception of the idea and during the initial growth stage leading to the realization of these high-performing startups. Is a company with three founders typically started by three engineers, or an engineer, a scientist and a business person? Do founders have to have business knowledge? How many founders does a startup typically have and what modulation of the number of founders and their educational background is observed?

To answer some of those questions, in Exhibit 16 we have depicted the results of our analysis.

Exhibit 16 (top panel), a matrix of "Number of Founders in the Company" by "Number of Backgrounds of Founders by Undergraduate Degree"

- 50.4 % of companies had one founder.
- Just over 30% of companies had two founders.
- 50.0% of the two-founder companies had founders with the same educational background.
- 50.0% of the two-founder companies had founders that had complementary training.

Exhibit 16 (middle panel), single-founder startups

• Of all the single-founder startups, engineers formed 28.0%, scientists 27.3%, and business undergrads 17.5%.

Exhibit 16 (bottom panel), two-founder startups

- Engineer–engineer and scientist–scientist companies are the most frequent pairing.
- Scientists collaborate very little with founders from other fields as almost in 75% of the two-founder companies with one science founder, the other partner is also a scientist.
- Overall founders from humanities and social sciences or from business, tend to form companies with partners from various educational backgrounds.
- Only 21.1% of all companies that have two founders have a founder with a background in business on the undergraduate level. That is an interesting observation, as it appears that expert subject matter knowledge in the field of the discovery is more crucial than business expertise.
- Overall, in the study, 24.0% of the founders had some formal business education, either at the undergraduate or graduate level, including MBA degrees.
- 21.8% of companies had at least one founder with formal business training.

Multiple Founders Exhibit 16



Compositions of Startups based on Number of Founders and Founder Education



Single-Founder Companies

Engineering
0%

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Two-Founder Companies Combinations

	Engineering	Science	Humanities and Social Science	Computer Science	Business	None
Engineering	21.1%	6.7%	7.8%	3.3%	5.6%	1.1%
Science		14.4%	2.2%	1.1%	1.1%	1.1%
Humanities and Social Science			6.7%	4.4%	7.8%	2.2%
Computer Science				3.3%	4.4%	1.1%
Business					2.2%	0.0%
None						2.2%



• Mobile and telecommunication, internet and consumer products and services tend to predominantly have multiple founders, while in the other sectors, single-founder companies predominate (Exhibit 17, top panel).

- The same sectors tend to also show a larger variation in educational backgrounds of founders (Exhibit 17, bottom panel).
- In the electronics industry single-founder companies are predominant at 80%. Only 20% is started by a pair, but even in those cases, the pair is found to have the same educational background, as only homogeneous educational background compositions are observed for this sector.
- Industrial and healthcare sectors are characterized with similar homogeneity.

Industry Sectors and Startup Founders

The visualizations of our individual analyses of the different parameters across industry sectors indicated that there are intercorrelated parameters and in this last section, we have rearranged the order of the sectors, as to emphasize commonalities and contrast differences among them (Exhibit 18). Below are some take-away points.

- The only category where the presence of engineering undergraduates is dwarfed compared to founders with a different educational background is the healthcare sector, where 74% of all founders have a science degree.
- The healthcare sector is unique in a number of other ways: it has the highest percentage of founders with a graduate degree, which are predominantly PhDs. Almost 40% of startups in healthcare are academic and scientists typically start companies either alone, or with other scientists.
- Sectors where graduate degrees are either on the master's or MBA levels, tend to have fewer founders with advanced degrees overall. Those are mobile and telecommunication, internet and consumer products and services.
- Startups in the mobile and telecommunication, internet and consumer products and services sectors tend to be founded by multiple entrepreneurs from different educational backgrounds, who have the lowest rate of graduate school attendance, but highest fraction of MBA degrees attained. Few academic spin-offs are reported in these sectors, as they are characterized with the lowest number of faculty founders. Founders with a humanities and social science, or business undergraduate background and those with no university degrees, tend to be more prevalent in these three sectors than in the other industries.



Summary of Education and Demographics of Startup Founders by Sector Exhibit 18

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What's Next?

In this report we have disseminated the educational and demographic portraits of founders of Canada's fastest growing tech startup companies. With 95% of the analyzed founders holding bachelor's degrees, it is clear that for these innovative entrepreneurs, education did not act as an impediment to their imagination, but rather as the vehicle that led to the realization of their entrepreneurial goals and ideas. But can entrepreneurship be taught in the classroom and does education play an essential role in shaping the entrepreneurs of tomorrow? That debate is ongoing, but plenty of studies have proven that education certainly plays an essential role in forming attitudes, skills and most importantly an entrepreneurial mindset (Küttim et al., 2014; Wilson, 2008).

In the follow-up report, we will examine the opportunities students from different faculties have in terms of classes and programs in entrepreneurship that are offered to them at the undergraduate level across some of Canada's top universities. Exploring the intersection of the findings of our two studies will uncover if indeed current educational prospects for entrepreneurship and innovation align with the needs of startups across different tech sectors.

Methodology

Methods

Canada's fastest growing startups compiled by CB Insights based on data from 2017 provided an initial starting point for the generation of a list of startup founders. Using the company information, the names of the founders were extracted either through searches on <u>https://www.crunchbase.com</u>, <u>https://www.bloomberg.com</u>, or through searches on LinkedIn. At least partial data was obtained for 335 companies. Once identified, the information on the founders' educational background was extracted from publicly available sources through LinkedIn, some from the sites listed above, company websites, or other Google searches. When all strategies were exhausted, the parameter entry was classified as "no information". In total, 585 founders were identified, of which 92.3% had educational information associated.

Hierarchical Classification

The analysis of the data was aided by the introduction of classification and hierarchy schemes for some of the parameters that tend to vary substantially by name when original data is collected, but might have a very closely related meaning. In order to ensure consistency in the classification process and aid in the reduction of the complexity of the data sets, this classification was performed methodically for the following parameters: undergraduate degree topic, graduate degree topic and graduate degree level.

Undergraduate degree topics have been classified to belong to the following five subcategories: business, computer science, engineering, humanities and social sciences, and science. Founders who have explicitly disclosed that they do not have an undergraduate degree were classified in the subcategory labeled as "None".

Graduate degrees, when available have been classified both on topic and on level. On the topic level they have been classified to belong to the following seven subcategories: business, computer science, engineering, humanities and social sciences, law, MBA, and science. The graduate degree levels have been classified into four subcategories: law, MBA, master's (including medicine), and PhD. The rational for the decision to group medicine with science and under the master's graduate degree was that the data was considerably simplified through this grouping, since it was found that the path of science or medicine streams was very similar, and at the undergraduate level identical.

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About the Impact Centre

Science to Society We generate impact through industry projects and partnerships, entrepreneurial companies, training and research.

We bridge the gap between the university and industry to accelerate the development of new or improved products and services based on physical technologies. We work with graduate students and researchers to help them commercialize their discoveries. We provide undergraduate education and training for students at all levels to ease their transition into future careers.

The Impact Centre conducts research on all aspects of innovation, from ideation and commercialization to government policy and broader themes such as the connection between science and international development. We study how companies of all sizes navigate the complex path between a discovery and its market and how their collective innovations add up to create a larger socioeconomic impact.

Our objective is to understand how we can improve our ability to create world-class technology companies, how governments, companies, and academia can identify and adopt best practices in technology commercialization.

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Contributors

Tihana Mirkovic Author Education Strategy and Development tmirkovic@imc.utoronto.ca 416-978-3158

Charles Plant Author Senior Fellow cplant@imc.utoronto.ca 416-458-4850 @cplant

Leo Mui Editor Manager, Entrepreneurship Initiatives Imui@imc.utoronto.ca 416-978-1457

Harim Ulfig



Impact Centre 60 St. George Street, Suite 331 Toronto, Ontario <u>Canada</u> M5S 1A7

Tel: 416-978-1457 info@imc.utoronto.ca www.impactcentre.ca