

Measuring Academic Research in Canada: Field-Normalized Academic Rankings 2012

Paul Jarvey
Alex Usher

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Contact:

Higher Education Strategy Associates
Unit 400, 460 Richmond Street, Toronto, ON M5V 1Y1, Canada
phone: 416.848.0215
fax: 416.849.0500
info@higheredstrategy.com

www.higheredstrategy.com

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Introduction

The purpose of this document is to provide an alternative way of measuring research strength at Canadian universities. Though research is clearly not the only dimension on which one would want to judge a university—teaching quality, student outcomes and contributions to the community are obviously important as well—it is nevertheless a very important element of institutional activity. In most universities in Canada, 40% of academic staff time is (at least nominally) supposed to be devoted to research activities. Measuring performance in this area is therefore an important step on the road to examining overall productivity and performance in the sector.

Determining which metric to use to accurately capture the essence of institutional research output is not entirely straightforward. All metrics have both strengths and weaknesses associated with them. For example, publication counts are one of the most-often used indicators of research prowess. This indicator has the very salient advantage of being relatively easy to obtain. Its disadvantages are (1) that it does not distinguish between the *quality* of publications (a publication which languishes un-cited in an obscure journal is given the same weight as a highly-cited paper in *Science* or *Nature*) and (2) when used to measure institutional performance, it tends to reward schools which are strong in disciplines with very active publication cultures and penalizes schools with more faculty members in disciplines with less active publication cultures. As a result, in many of the international rankings, an average professor in a department like physics might be worth a dozen professors in most of the humanities in terms of their contribution to the overall figures.

Analyzing citations rather than publications sidesteps the central problem of publication counts by only rewarding research that is consistently recognized by other faculty. The problem of disciplinary bias, however, remains; individual researchers' records can be massively affected by a single highly-cited paper. There is also the minor problem that citations analyses cannot distinguish between papers cited approvingly and those cited as being mistaken or erroneous.

One method sometimes used to limit the distortions of abnormal publication or citation data is to use H-index scores. These scores are equal to “the largest possible number n for which n of a researcher's publications have been cited at least n times.” They therefore avoid some of the problems associated with both publications and citations: large numbers of un-cited papers will not result in a higher index, and a single, highly-cited paper cannot by itself skew an H-index score. What is rewarded instead is a large number of well-cited papers—a measure, in essence, of consistent impact. Two common criticisms of the H-index are (1) that it is somewhat backwards-looking, rewarding good papers that have been in circulation a long time (a charge which can to some extent be made of publications and citations counts as well but is more true of the H-index) and (2) that it, too, suffers from the same problems of disciplinary bias as publications and citations measures.

Often, research income from public granting councils and/or private sources is used as a measure of research excellence. Sometimes, this data is presented as a raw, aggregate figure per institution, and sometimes it is divided by the number of faculty members to create a measure of income per faculty member. Of course, the actual value or quality of research may not have much to do with the amount of

money involved in research grants. Not all fields of study intrinsically require the same amount of capital in order to conduct research. Research in economics, for instance, typically requires money for IT and data acquisition (and of course graduate students)—expensive, possibly, but a small fraction of the infrastructure sometimes used in high-energy physics or cutting-edge biomedicine.

Patents/Commercialization Income are also sometimes used as measures of research “outputs.” Many of the issues about research funding crop up here, too, even though one is an input and the other an output; high income from patents and commercialization is often closely connected to performance in specific disciplines like biomedicine, electrical engineering and computer science rather than performance across a broader set of disciplines.

As should be obvious from this brief round-up, a key problem with research output measurement systems is the issue of *field neutrality*. That is to say, that not all fields of research are alike. Physicists tend to publish and cite more than historians, and the average value of the public-sector research grants available to them are also larger, too. As a result, in rankings based on traditional metrics—such as the ones by *Research InfoSource* in its annual ranking of Canada’s Top 50 Research Universities—“good” universities may simply be the ones with strengths in fields with high average grants and citation counts. Obviously, there may be a degree of auto-correlation at play; universities that are good at the “money” disciplines are likely also good in non-money disciplines as well. But that is mere supposition—existing Canadian research metrics assume this rather than demonstrate it.

Another, perhaps less obvious issue, is the degree to which different measurements capture different aspects of research strength. All publication-based measures are to some degree backward-looking in that they look at evidence of past accomplishments. This can be partially mitigated by limiting the publication period to five or ten years, but the point remains to some extent. Research income, on the other hand, is a much more current or even future-oriented measure of research strength. These are both important measures of performance that best reflect actual performance when used in tandem.

In order to best analyze institutional research performance, a combination of metrics should be designed with the following characteristics:

- Measures of historical performance in research (which can be thought of as measuring an institution’s stock of knowledge, or “academic capital”) should be balanced with measures of current or potential strength.
- Bias towards particular disciplines with high capital requirements for research and high publication/citation cultures need to be minimized. In other words, metrics should be field-neutral.

With these characteristics in mind, HESA has developed a new set of metrics for comparing and ranking research output at Canadian institutions, which we present in the following pages.

Methodology

This exercise uses two sources of data to compare the research performance of Canadian universities.

In order to measure an institution's "academic capital," we chose a bibliometric measure which measures both overall productivity and impact; namely, the H-index. Data for this measure was obtained through HESA's proprietary H-index Benchmarking of Academic Research (HiBAR) database (see Appendix B for more details on HiBAR and how it was compiled). Using this data, it is possible to determine publication norms in each discipline, simply by averaging the H-index scores of all the academics belonging to departments in each discipline or field of study.¹ Each academic's H-index score was then normalized by dividing it by this national average. These field-normalized normalized scores can then be averaged at an institutional level. This ensures that schools do not receive an undue advantage simply by being particularly good in a few disciplines with high publication and citation cultures.

In order to measure "current strength," we chose to use grants from the federal granting councils as an indicator. In this exercise, we use granting council expenditures for the year 2010-11, obtained directly from NSERC and SSHRC (see Appendix A for details). Note that we use expenditures rather than awards; that is to say, we include all money from single-year grants awarded in 2010-11 in addition to payments in the current year for multi-year grants, but exclude money awarded this year which is to be disbursed in future years, and money awarded in prior years which was disbursed in prior years. An "average" grant per professor figure is derived by summing the total amount of granting council awards given to professors in each academic discipline and then dividing it by the number of researchers in that field. A normalized score for each department at each institution is then derived by dividing the amount of money awarded to researchers in that department by the product of the national average grant per professor and the number of professors in the department.

In other types of rankings, the lack of field-normalization tends to bias results towards institutions which have strength in disciplines which have more aggressive publication and citation cultures and in which research is expensive to conduct—in particular physics and the life sciences. The process of field-normalizing both the H-index and granting council results removes these biases and allows the performance of academics to be judged simply against the norms of their own disciplines. To achieve results in field-normalized rankings, institutions cannot simply rely on a strong performance in a few select disciplines. Instead, breadth of excellence is required.

Using this field-normalized data, the rankings were constructed as follows:

- 1) The data was divided into two groups: the natural sciences and engineering, and the social sciences and humanities. While it would be possible to simply report an aggregate normalized score across all disciplines, showing results separately more clearly allows institutions that have

¹ This process is described in more detail in our previous paper on this subject, Jarvey, P., A. Usher and L. McElroy. 2012. [Making Research Count: Analyzing Canadian Academic Publishing Cultures](#). Toronto: Higher Education Strategy Associates. A summary of the methodology is furthermore included in Appendix B.

specialized in one or the other area to show their relative strengths. Medical and health-related disciplines are excluded from this study (see box below).

- 2) In both broad fields, we rank institutions on both their H-index results and their granting council results. Scores in each ranking are derived by giving the top discipline 100 points and awarding points to every other institution in direct proportion to their results.
- 3) An overall ranking in both fields is created by summing the scores given in the H-index and granting council awards rankings (i.e., each is weighted at 50%).

One final note about this methodology is in order. In most rankings, the denominator for the majority of indicators is the institution—publications per institution, research dollars per institution, etc. Implicitly, this methodology favours larger institutions, since they have more researchers who can bring in money. In our methodology, the denominator is the number of professors at an institution. This changes the equation somewhat, as it reduces the advantage of size. Other methodologies favour large absolute numbers; ours favours high average numbers. The two methodologies do not provide completely different pictures: in Canada, the largest institutions tend to attract the most research-intensive faculty, so big institutions tend to have high average productivity, too. But they are not identical, either.

Why is Medicine Excluded From This Study?

The reason we do not include medicine in these rankings is simply that different institutions have different practices in terms of how they list “staff” in medicine. Some institutions tend to list a relatively small number of staff; others appear to include virtually every medical researcher at every hospital located within a 50-mile radius of the university. Some are good at distinguishing between academic faculty and clinicians, and others are not. Thus, while we are able to calculate H-index data on all individuals listed by institutions as staff, an apples-to-apples comparison is clearly impossible.

We recognize that this exclusion means that our results necessarily will understate the institution-wide performance levels of those universities that demonstrate true excellence in medical fields. The University of Toronto, in particular, appears weaker overall in this exercise than it would if medicine were included.

If it were in our power to include medical disciplines, we would do so; however, at this time, it is impossible.

Results—Science and Engineering

For science and engineering, we present data on all institutions which listed more than 30 active academics on the websites in science and engineering disciplines.²

We began by looking at the average normalized institutional H-index scores, which are shown in Table 1 (following page). A score of one on this measure means that the average professor at that institution has an H-index exactly equal to the national average in his or her discipline. The University of British Columbia scores top overall at 1.51, followed extremely closely by the University of Toronto (St. George) and l'Université de Montreal, where average H-index scores were 1.50. McGill and Simon Fraser are fourth and fifth, some distance behind (1.33 and 1.31, respectively).

Perhaps the most surprising positions in the H-index rankings are those of two small universities, l'Université du Québec à Rimouski (1.20, tenth overall) and Trent University (1.16, twelfth overall). These institutions come ahead of some much larger and more prestigious universities, including Laval, Alberta and Western. These results highlight the difference between an approach which uses institutions as a denominator and those which use professors as a denominator, as well as the importance of field normalization. Rimouski gets a very high score because of the very high productivity of its researchers specializing in marine sciences. Trent gets a high overall ranking because all of its professors have an H-index of at least one, meaning that they each have at least one cited paper in the Google Scholars database. In comparison, at most U-15 schools, about one in ten scientists have no such paper. In other publication comparisons, these schools tend to do well either because of their sheer size, or because they happen to have some strength in disciplines which have higher levels of citations and publication; normalizing for size and field removes these advantages and hence reveal a different set of “top” institutions.

Table 2 (following pages) compares average field-normalized funds received through NSERC. A score of one on this measure means that the average research grant per professor is exactly equal to the national average research grant per professor in that discipline. This list contains fewer surprises, in that the schools that one traditionally thinks of as having strong research traditions (i.e., the U-15) tend to come higher up the list. The University of British Columbia again comes first. Montreal and Toronto remain in the top five, accompanied by Ottawa and Alberta. Saskatchewan, in eighth, would actually have come second had we elected to include the Major Research Projects funding envelope in the calculations (we did not, partly because of the distorting nature of the data and partly because the funding envelope was recently cut). Rimouski, again, manages to come in the top ten, again because of the very strong performance of its marine scientists.

² See Appendix A for more details.

Table 1: Science and engineering discipline-normalized bibliometric (H-index) scores

| Rank | Institution | Count | Mean Standardized | | Rank | Institution | Count | Mean Standardized | |
|------|-----------------------|-------|-------------------|--------|------|-----------------------------|-------|-------------------|--------|
| | | | Score | Points | | | | Score | Points |
| 1 | UBC | 611 | 1.509 | 100.00 | 29 | UQ Chicoutimi | 70 | 0.804 | 53.30 |
| 2 | Toronto - St. George | 1118 | 1.504 | 99.72 | 30 | Windsor | 208 | 0.795 | 52.67 |
| 3 | Montreal | 345 | 1.500 | 99.41 | 31 | UBC - Okanagan | 102 | 0.737 | 48.83 |
| 4 | McGill | 685 | 1.327 | 87.97 | 32 | Dalhousie | 479 | 0.722 | 47.89 |
| 5 | Simon Fraser | 364 | 1.306 | 86.55 | 33 | Bishop's | 38 | 0.677 | 44.85 |
| 6 | Waterloo | 776 | 1.257 | 83.34 | 34 | University of New Brunswick | 282 | 0.668 | 44.26 |
| 7 | Ottawa | 267 | 1.254 | 83.15 | 35 | Saint Mary's | 95 | 0.663 | 43.98 |
| 8 | York | 280 | 1.208 | 80.06 | 36 | Laurentian | 130 | 0.663 | 43.92 |
| 9 | Queen's | 409 | 1.200 | 79.53 | 37 | Sherbrooke | 331 | 0.643 | 42.63 |
| 10 | UQ Rimouski | 88 | 1.200 | 79.53 | 38 | Wilfrid Laurier | 88 | 0.633 | 41.97 |
| 11 | McMaster | 440 | 1.197 | 79.36 | 39 | Mount Allison | 43 | 0.608 | 40.31 |
| 12 | Trent | 90 | 1.160 | 76.88 | 40 | Lakehead | 193 | 0.591 | 39.16 |
| 13 | Toronto - Scarborough | 130 | 1.153 | 76.40 | 41 | UOIT | 141 | 0.576 | 38.18 |
| 14 | Manitoba | 460 | 1.057 | 70.09 | 42 | Lethbridge | 173 | 0.575 | 38.10 |
| 15 | UQ Trois-Rivières | 109 | 1.054 | 69.85 | 43 | Brandon | 35 | 0.548 | 36.30 |
| 16 | Alberta | 659 | 1.026 | 68.01 | 44 | Regina | 122 | 0.542 | 35.93 |
| 17 | Western | 374 | 0.996 | 66.04 | 45 | St. FX | 112 | 0.494 | 32.75 |
| 18 | Concordia | 250 | 0.992 | 65.76 | 46 | Ryerson | 282 | 0.493 | 32.70 |
| 19 | Laval | 457 | 0.989 | 65.54 | 47 | ETS | 137 | 0.478 | 31.69 |
| 20 | UQ Montreal | 287 | 0.967 | 64.06 | 48 | UPEI | 75 | 0.462 | 30.61 |
| 21 | Calgary | 385 | 0.960 | 63.63 | 49 | Winnipeg | 110 | 0.393 | 26.08 |
| 22 | Saskatchewan | 413 | 0.928 | 61.53 | 50 | Acadia | 83 | 0.378 | 25.05 |
| 23 | Victoria | 390 | 0.885 | 58.63 | 51 | Cape Breton | 33 | 0.314 | 20.80 |
| 24 | Guelph | 455 | 0.868 | 57.54 | 52 | Brock | 80 | 0.300 | 19.87 |
| 25 | Toronto - Mississauga | 82 | 0.835 | 55.35 | 53 | Mount Saint Vincent | 39 | 0.286 | 18.98 |
| 26 | Memorial | 367 | 0.833 | 55.25 | 54 | Thompson Rivers | 99 | 0.251 | 16.65 |
| 27 | UNBC | 51 | 0.827 | 54.82 | 55 | Moncton | 109 | 0.221 | 14.63 |
| 28 | Carleton | 279 | 0.823 | 54.55 | | | | | |

Table 2: Science and engineering discipline-normalized funding scores

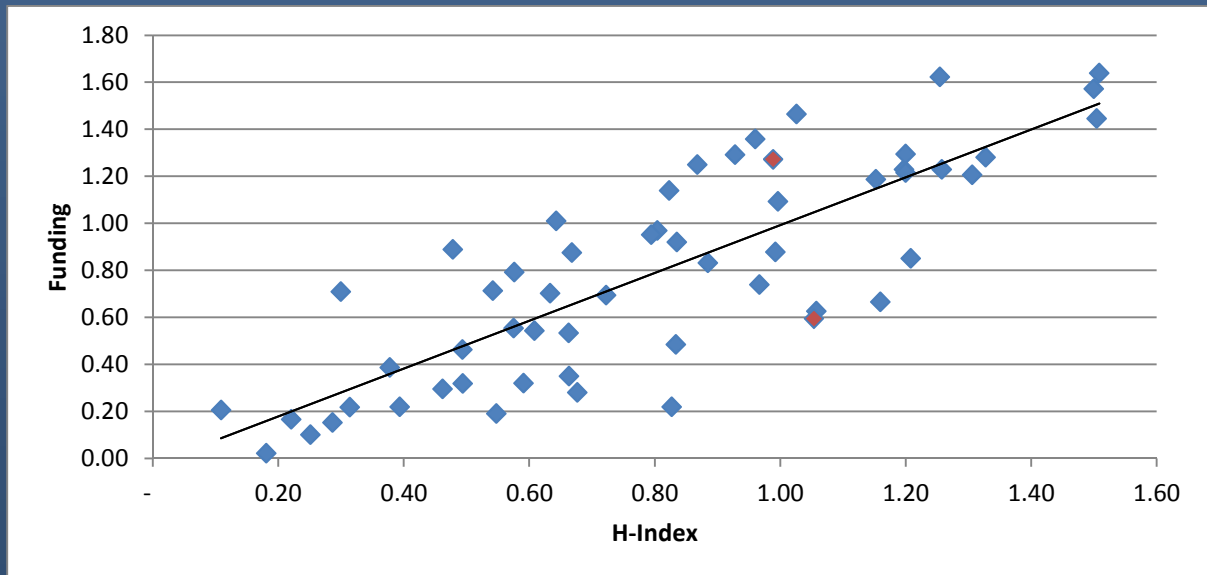
| Rank | Institution | Normalized Funding Amount (new) | Points | Rank | Institution | Normalized Funding Amount (new) | Points |
|-------|---------------------|---------------------------------|--------|------|---------------------|---------------------------------|--------|
| 1.00 | UBC | 1.640 | 100.00 | 29 | UOIT | 0.792 | 48.32 |
| 2.00 | Ottawa | 1.623 | 98.95 | 30 | UQ Montreal | 0.739 | 45.08 |
| 3.00 | Montreal | 1.572 | 95.86 | 31 | Regina | 0.714 | 43.53 |
| 4.00 | Alberta | 1.465 | 89.33 | 32 | Brock | 0.709 | 43.23 |
| 5.00 | Toronto-St. George | 1.447 | 88.21 | 33 | Wilfrid Laurier | 0.703 | 42.86 |
| 6.00 | Calgary | 1.359 | 82.89 | 34 | Dalhousie | 0.694 | 42.33 |
| 7.00 | UQ Rimouski | 1.295 | 78.95 | 35 | Trent | 0.666 | 40.63 |
| 8.00 | Saskatchewan | 1.292 | 78.77 | 36 | Manitoba | 0.626 | 38.20 |
| 9.00 | McGill | 1.281 | 78.13 | 37 | UQ Trois-Rivières | 0.594 | 36.21 |
| 10.00 | Laval | 1.272 | 77.56 | 38 | Lethbridge | 0.554 | 33.80 |
| 11.00 | Guelph | 1.250 | 76.22 | 39 | Mount Allison | 0.543 | 33.12 |
| 12.00 | McMaster | 1.230 | 74.99 | 40 | Laurentian | 0.534 | 32.55 |
| 13.00 | Waterloo | 1.229 | 74.94 | 41 | Memorial | 0.484 | 29.52 |
| 14.00 | Queen's | 1.216 | 74.17 | 42 | Ryerson | 0.463 | 28.20 |
| 15.00 | Simon Fraser | 1.206 | 73.52 | 43 | Acadia | 0.387 | 23.60 |
| 16.00 | Toronto-Scarborough | 1.187 | 72.39 | 44 | Saint Mary's | 0.349 | 21.31 |
| 17.00 | Carleton | 1.139 | 69.46 | 45 | Lakehead | 0.320 | 19.48 |
| 18.00 | Western | 1.093 | 66.65 | 46 | St. FX | 0.319 | 19.43 |
| 19.00 | Sherbrooke | 1.011 | 61.63 | 47 | UPEI | 0.295 | 18.01 |
| 20.00 | UQ Chicoutimi | 0.969 | 59.09 | 48 | Bishop's | 0.280 | 17.10 |
| 21.00 | Windsor | 0.951 | 58.02 | 49 | Winnipeg | 0.219 | 13.36 |
| 22.00 | Toronto-Mississauga | 0.920 | 56.10 | 50 | UNBC | 0.219 | 13.35 |
| 23.00 | ETS | 0.889 | 54.21 | 51 | Cape Breton | 0.217 | 13.25 |
| 24.00 | Concordia | 0.879 | 53.58 | 52 | Brandon | 0.191 | 11.63 |
| 25.00 | New Brunswick | 0.875 | 53.35 | 53 | Moncton | 0.167 | 10.17 |
| 26.00 | York | 0.851 | 51.88 | 54 | Mount Saint Vincent | 0.152 | 9.26 |
| 27.00 | Victoria | 0.832 | 50.76 | 55 | Thompson Rivers | 0.101 | 6.17 |
| 28.00 | UBC - Okanagan | 0.800 | 48.78 | | | | |

Understanding the relationship between bibliometric and funding scores in the natural sciences and engineering

As Figure 1 shows, there is a generally positive correlation between bibliometric and funding indicators of institutional research strength. This is to be expected—indeed, it would be deeply worrying if such a relationship did not exist. However, while the general relationship holds, there are numerous outliers.

In Figure 1, institutions represented by dots below the line are those that have high H-index counts relative to the amount of funding they receive, while those above the line receive high levels of funding given their H-index counts. An interesting comparison can be made, for instance, between Laval and UQTR. Trois-Rivières' field-normalized H-index scores in NSERC disciplines are slightly better than Laval's (1.05 vs. 0.99), yet Laval receives field-normalized granting council funding at over well over twice UQTR's rate (1.27 vs. 0.59). It is not at all clear why this happens.

Figure 1: Correlation between Field-Normalized H-Index Scores and Field-Normalized Granting Council Funding (natural sciences and engineering)



Among schools with substantial research presences, Laval, Ottawa, Calgary, Saskatchewan, Sherbrooke, Guelph and Alberta all receive substantially more money in granting council funds on a field-normalized basis than one would expect given their bibliometric performance. Conversely, Simon Fraser, Concordia, York, Manitoba, Trent, Toronto (St. George), UQAM and Memorial all receive substantially less money than one would expect given their bibliometric performance.

Table 3 provides the overall rankings for engineering and sciences. The first column presents the institutional scores from Table 1, while the second presents scores from Table 2. The total score is simply an average of the two previous scores.

Unsurprisingly, since it topped both of the previous tables, The University of British Columbia comes first overall, with a score of 100, fractionally ahead of l'Université de Montréal (for purposes of this comparison, l'École Polytechnique is included as part of U de M) at 97.63, and the University of Toronto (St. George) at 93.97.³ Fourth and fifth places belong to Ottawa and McGill.

There is some distance between the top five and the rest of the pack; after Simon Fraser, in sixth place, the gap between university scores become much smaller. There is little, for instance, to distinguish between seventh-place Rimouski, eighth-place Waterloo or ninth-place Alberta. McMaster University rounds out the top ten.

From a high level, the list of top science and engineering universities looks a lot like one would expect, in that thirteen of the top fifteen schools are in the U-15 (though one—Toronto—is represented twice because of the strong performance of the Scarborough campus). It is, however, the exceptions that draw the eye. Rimouski in seventh position is an amazing result, as is Scarborough in twelfth (ahead of Calgary) and, to a lesser degree, Trent in 21st.

³ If Toronto were considered as a single university, its overall score would drop to just under 90, but the school would remain in third place overall.

Table 3: Total normalized scores (natural sciences and engineering)

| Rank | Institution | H-index | Funding | Total Score | Rank | Institution | H-index | Funding | Total Score |
|------|-----------------------|---------|---------|-------------|------|---------------------|---------|---------|-------------|
| 1 | UBC | 100.00 | 100.00 | 100.00 | 29 | Sherbrooke | 42.63 | 61.63 | 52.13 |
| 2 | Montreal | 99.41 | 95.86 | 97.63 | 30 | UBC - Okanagan | 48.83 | 48.78 | 48.81 |
| 3 | Toronto - St.George | 99.72 | 88.21 | 93.97 | 31 | UNB | 44.26 | 53.35 | 48.80 |
| 4 | Ottawa | 83.15 | 98.95 | 91.05 | 32 | Dalhousie | 47.89 | 42.33 | 45.11 |
| 5 | McGill | 87.97 | 78.13 | 83.05 | 33 | UOIT | 38.18 | 48.32 | 43.25 |
| 6 | SFU | 86.55 | 73.52 | 80.04 | 34 | ETS | 31.69 | 54.21 | 42.95 |
| 7 | UQ Rimouski | 79.53 | 78.95 | 79.24 | 35 | Wilfrid Laurier | 41.97 | 42.86 | 42.42 |
| 8 | Waterloo | 83.34 | 74.94 | 79.14 | 36 | Memorial | 55.25 | 29.52 | 42.38 |
| 9 | Alberta | 68.01 | 89.33 | 78.67 | 37 | Regina | 35.93 | 43.53 | 39.73 |
| 10 | McMaster | 79.36 | 74.99 | 77.18 | 38 | Laurentian | 43.92 | 32.55 | 38.24 |
| 11 | Queen's | 79.53 | 74.17 | 76.85 | 39 | Mount Allison | 40.31 | 33.12 | 36.71 |
| 12 | Toronto - Scarborough | 76.40 | 72.39 | 74.40 | 40 | Lethbridge | 38.10 | 33.80 | 35.95 |
| 13 | Calgary | 63.63 | 82.89 | 73.26 | 41 | UNBC | 54.82 | 13.35 | 34.08 |
| 14 | Laval | 65.54 | 77.56 | 71.55 | 42 | Saint Mary's | 43.98 | 21.31 | 32.64 |
| 15 | Saskatchewan | 61.53 | 78.77 | 70.15 | 43 | Brock | 19.87 | 43.23 | 31.55 |
| 16 | Guelph | 57.54 | 76.22 | 66.88 | 44 | Bishop's | 44.85 | 17.10 | 30.97 |
| 17 | Western | 66.04 | 66.65 | 66.34 | 45 | Ryerson | 32.70 | 28.20 | 30.45 |
| 18 | York | 80.06 | 51.88 | 65.97 | 46 | Lakehead | 39.16 | 19.48 | 29.32 |
| 19 | Carleton | 54.55 | 69.46 | 62.01 | 47 | St. FX | 32.75 | 19.43 | 26.09 |
| 20 | Concordia | 65.76 | 53.58 | 59.67 | 48 | Acadia | 25.05 | 23.60 | 24.32 |
| 21 | Trent | 76.88 | 40.63 | 58.76 | 49 | UPEI | 30.61 | 18.01 | 24.31 |
| 22 | UQ Chicoutimi | 53.30 | 59.09 | 56.19 | 50 | Brandon | 36.30 | 11.63 | 23.96 |
| 23 | Toronto - Mississauga | 55.35 | 56.10 | 55.72 | 51 | Winnipeg | 26.08 | 13.36 | 19.72 |
| 24 | Windsor | 52.67 | 58.02 | 55.34 | 52 | Cape Breton | 20.80 | 13.25 | 17.03 |
| 25 | Victoria | 58.63 | 50.76 | 54.69 | 53 | Mount Saint Vincent | 18.98 | 9.26 | 14.12 |
| 26 | UQ Montreal | 64.06 | 45.08 | 54.57 | 54 | Moncton | 14.63 | 10.17 | 12.40 |
| 27 | Manitoba | 70.09 | 38.20 | 54.14 | 55 | Thompson Rivers | 16.65 | 6.17 | 11.41 |
| 28 | UQ Trois-Rivières | 69.85 | 36.21 | 53.03 | | | | | |

Results—Social Science and Humanities

Table 4 shows each institution's average normalized institutional H-index scores. The University of British Columbia comes first on this measure by some considerable distance. Essentially, what the H-index score for UBC (1.93) says is that the *average* professor at that university has a record of publication productivity and impact which is twice the national average for their discipline; some, of course, have scores which are considerably higher.

Following some distance behind this are the University of Toronto (1.67) and McGill (1.63), followed more distantly by Queen's University (1.53). There is then another substantial gap between Queen's and the next two institutions, Alberta (1.37) and McMaster (1.36). Rounding out the top ten are three more Ontario institutions (York, Guelph and Waterloo—the latter two somewhat surprisingly since they are better known for their science and engineering), plus Simon Fraser University in British Columbia.

One thing to note here is that the Quebec universities do significantly less well in these comparisons than they did in science and engineering. The reason for this is almost certainly linguistic. The H-index, by design, only looks at publications that receive citations. Francophone academics publishing in French may produce the same volume of work as someone publishing in English, but they are speaking to a much smaller worldwide audience and therefore their work is substantially less likely to be cited by others. This is not as much of a concern in science and engineering because these disciplines have a tradition of publishing in English. In the social sciences and the humanities, however, French is still widely used as a means of scholarly communication, with negative consequences for bibliometric comparisons such as this one. To get a sense of how important the linguistic factor is, if we were to treat the École des Hautes Études Commerciales—a business school where scholars for the most part publish in English—as a separate institution, it would come eleventh overall, substantially higher than any other francophone institution (conversely, without HEC, Montreal would fall from 18th to 21st overall).

Table 4: Social sciences and humanities bibliometric (H-index) scores

| Rank | Institution | Count | Mean Standardized | | Rank | Institution | Count | Mean Standardized | |
|------|----------------------|-------|-------------------|--------|------|-------------------|-------|-------------------|--------|
| | | | Score | Points | | | | Score | Points |
| 1 | UBC | 995 | 1.927 | 100.00 | 32 | UQ Trois-Rivières | 325 | 0.792 | 41.09 |
| 2 | Toronto - St. George | 1799 | 1.674 | 86.89 | 33 | Lethbridge | 311 | 0.787 | 40.84 |
| 3 | McGill | 814 | 1.629 | 84.52 | 34 | UQ - Montreal | 2473 | 0.728 | 37.77 |
| 4 | Queen's | 621 | 1.533 | 79.56 | 35 | Ryerson | 726 | 0.724 | 37.59 |
| 5 | Alberta | 713 | 1.370 | 71.12 | 36 | UQ - Rimouski | 171 | 0.721 | 37.43 |
| 6 | McMaster | 456 | 1.364 | 70.78 | 37 | Thompson Rivers | 232 | 0.690 | 35.82 |
| 7 | York | 1112 | 1.331 | 69.06 | 38 | Acadia | 147 | 0.680 | 35.27 |
| 8 | Guelph | 309 | 1.320 | 68.50 | 39 | New Brunswick | 311 | 0.668 | 34.68 |
| 9 | Simon Fraser | 846 | 1.312 | 68.09 | 40 | Laval | 1534 | 0.668 | 34.65 |
| 10 | Waterloo | 568 | 1.289 | 66.91 | 41 | Brandon | 136 | 0.660 | 34.24 |
| 11 | Concordia | 577 | 1.244 | 64.55 | 42 | Lakehead | 200 | 0.651 | 33.78 |
| 12 | Trent | 290 | 1.238 | 64.23 | 43 | Regina | 329 | 0.647 | 33.59 |
| 13 | Toronto-Mississauga | 369 | 1.219 | 63.29 | 44 | St. Thomas | 183 | 0.639 | 33.15 |
| 14 | Toronto-Scarborough | 305 | 1.192 | 61.86 | 45 | Winnipeg | 275 | 0.623 | 32.31 |
| 15 | Carleton | 614 | 1.162 | 60.31 | 46 | UNBC | 147 | 0.617 | 32.02 |
| 16 | Manitoba | 609 | 1.130 | 58.66 | 47 | Sherbrooke | 504 | 0.592 | 30.71 |
| 17 | Montréal | 1309 | 1.096 | 56.86 | 48 | Saint Mary's | 321 | 0.585 | 30.36 |
| 18 | Calgary | 690 | 1.070 | 55.51 | 49 | Fraser Valley | 117 | 0.583 | 30.26 |
| 19 | Saskatchewan | 459 | 1.054 | 54.72 | 50 | Laurentian | 299 | 0.560 | 29.05 |
| 20 | Western | 1071 | 1.016 | 52.72 | 51 | Moncton | 218 | 0.537 | 27.88 |
| 21 | Victoria | 759 | 1.008 | 52.33 | 52 | St. FX | 208 | 0.515 | 26.71 |
| 22 | Dalhousie | 480 | 1.007 | 52.24 | 53 | Athabasca | 98 | 0.511 | 26.53 |
| 23 | UOIT | 130 | 0.980 | 50.88 | 54 | Cape Breton | 105 | 0.506 | 26.28 |
| 24 | Windsor | 422 | 0.964 | 50.02 | 55 | UQ - Chicoutimi | 144 | 0.483 | 25.08 |
| 25 | Wilfrid Laurier | 514 | 0.945 | 49.06 | 56 | Mount Allison | 153 | 0.468 | 24.28 |
| 26 | UPEI | 148 | 0.874 | 45.35 | 57 | Bishop's | 114 | 0.444 | 23.06 |
| 27 | UBC -Okanagan | 170 | 0.851 | 44.18 | 58 | King's (NS) | 163 | 0.428 | 22.20 |
| 28 | Ottawa | 1436 | 0.845 | 43.86 | 59 | Nipissing | 198 | 0.387 | 20.11 |
| 29 | Mount Saint Vincent | 142 | 0.844 | 43.82 | 60 | Royal Roads | 240 | 0.214 | 11.09 |
| 30 | Brock | 424 | 0.829 | 43.00 | 61 | OCAD | 134 | 0.189 | 9.83 |
| 31 | Memorial | 407 | 0.808 | 41.93 | | | | | |

Table 5: Social sciences and humanities discipline-normalized funding scores

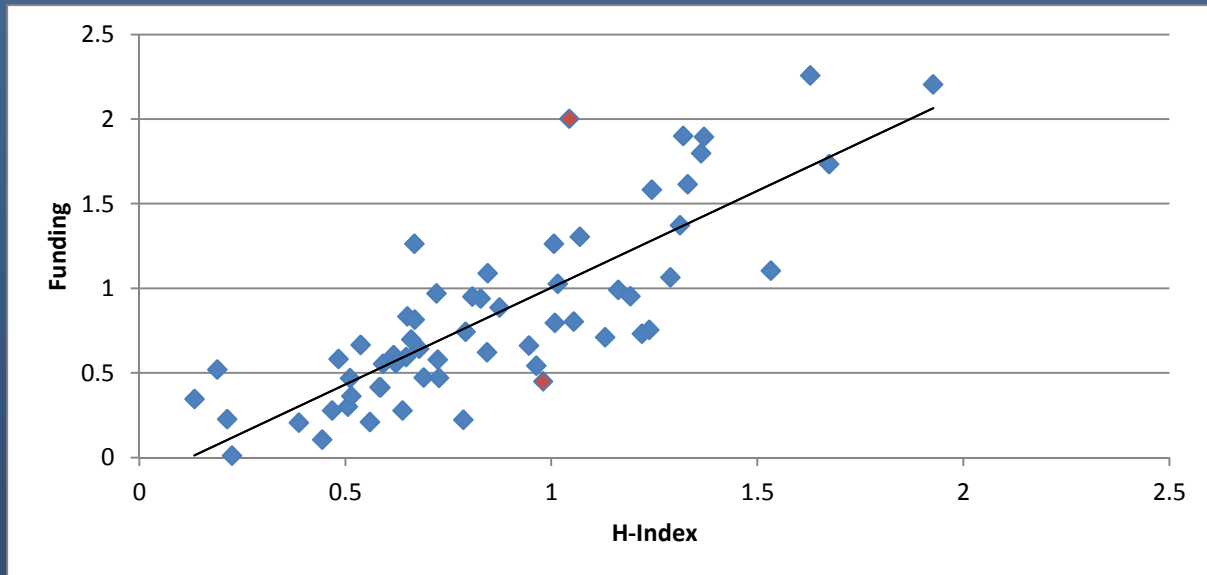
| Rank | Institution | SSHRC - Funding | Score | Rank | Institution | SSHRC - Funding | Score |
|------|---------------------|-----------------|--------|------|---------------------|-----------------|-------|
| 1 | McGill | 2.258 | 100.00 | 32 | Brandon | 0.698 | 30.93 |
| 2 | UBC | 2.206 | 97.67 | 33 | Moncton | 0.666 | 29.51 |
| 3 | Montréal | 1.944 | 86.08 | 34 | Wilfrid Laurier | 0.662 | 29.30 |
| 4 | Guelph | 1.901 | 84.19 | 35 | UBC - Okanagan | 0.660 | 29.24 |
| 5 | Alberta | 1.895 | 83.91 | 36 | Acadia | 0.643 | 28.46 |
| 6 | McMaster | 1.799 | 79.66 | 37 | Mount Saint Vincent | 0.622 | 27.53 |
| 7 | Toronto-St. George | 1.733 | 76.77 | 38 | UNBC | 0.605 | 26.78 |
| 8 | York | 1.615 | 71.51 | 39 | Regina | 0.594 | 26.32 |
| 9 | Concordia | 1.582 | 70.08 | 40 | UQ - Chicoutimi | 0.582 | 25.76 |
| 10 | Simon Fraser | 1.372 | 60.78 | 41 | Ryerson | 0.578 | 25.60 |
| 11 | Calgary | 1.305 | 57.79 | 42 | Winnipeg | 0.559 | 24.74 |
| 12 | Dalhousie | 1.263 | 55.94 | 43 | Sherbrooke | 0.553 | 24.50 |
| 13 | Laval | 1.263 | 55.93 | 44 | Windsor | 0.542 | 24.01 |
| 14 | Queen's | 1.105 | 48.95 | 45 | OCAD | 0.520 | 23.01 |
| 15 | Ottawa | 1.090 | 48.26 | 46 | Thompson Rivers | 0.473 | 20.96 |
| 16 | Waterloo | 1.065 | 47.15 | 47 | UQ - Montreal | 0.471 | 20.88 |
| 17 | Carleton | 0.991 | 43.88 | 48 | Athabasca | 0.469 | 20.79 |
| 18 | UQ - Rimouski | 0.971 | 43.00 | 49 | UOIT | 0.450 | 19.92 |
| 19 | Toronto-Scarborough | 0.953 | 42.20 | 50 | Fraser Valley | 0.416 | 18.43 |
| 20 | Western | 0.951 | 42.13 | 51 | Saint Mary's | 0.414 | 18.34 |
| 21 | Memorial | 0.951 | 42.13 | 52 | St. FX | 0.363 | 16.10 |
| 22 | Brock | 0.941 | 41.66 | 53 | Cape Breton | 0.301 | 13.33 |
| 23 | UPEI | 0.886 | 39.26 | 54 | Mount Allison | 0.278 | 12.30 |
| 24 | Lakehead | 0.834 | 36.94 | 55 | St. Thomas | 0.277 | 12.28 |
| 25 | New Brunswick | 0.815 | 36.09 | 56 | Royal Roads | 0.227 | 10.04 |
| 26 | Saskatchewan | 0.804 | 35.62 | 57 | Lethbridge | 0.223 | 9.87 |
| 27 | Victoria | 0.796 | 35.27 | 58 | Laurentian | 0.210 | 9.31 |
| 28 | Trent | 0.755 | 33.42 | 59 | Nipissing | 0.206 | 9.12 |
| 29 | UQ – Trois-Rivières | 0.744 | 32.95 | 60 | Bishop's | 0.107 | 4.72 |
| 30 | Toronto-Mississauga | 0.733 | 32.44 | 61 | King's (NS) | 0.000 | 0.00 |
| 31 | Manitoba | 0.710 | 31.46 | | | | |

Table 5 (above) shows each institution’s field-normalized granting council income in social sciences and humanities. There is substantially more variation in institutional scores on this indicator than the equivalent one in sciences and engineering, largely because a far smaller proportion of academics in SSHRC-related fields receive grants than do those in NSERC-related fields. McGill comes first on this measure (2.258), followed closely by the University of British Columbia (2.206) and l’Université de Montréal (1.944). Guelph—which tends to be thought of as stronger in the sciences than in the social sciences and humanities—is fourth, followed by the University of Alberta.

Understanding the Relationship between Bibliometric and Funding Scores in the Social Sciences and Humanities

As in sciences and engineering, there is a generally positive correlation between bibliometric indicators of institutional research strength and granting council ones. But as with sciences and engineering, there is also some significant variation around the mean as well. L’Université de Montréal, for example, has normalized funding scores which are twice its normalized H-index scores (2.00 and 1.04), while UOIT, which has a very similar bibliometric performance to Montreal’s, has a normalized funding performance only one-quarter as strong (0.44 and 0.98).

Figure 2: Correlation between Field-Normalized H-Index Scores and Field-Normalized Granting Council Funding (social sciences and humanities)



Among schools with substantial research presences, McGill, Laval, Guelph, Alberta, Montreal and McMaster all receive substantially more money in granting council funds on a field-normalized basis than one would expect given their bibliometric performance. Conversely, Queen’s, Trent and Toronto (Mississauga) all receive substantially less money than one would expect given their bibliometric performance.

Table 6 provides the overall rankings for humanities and social sciences. The first column presents the institutional scores from Table 4, while the second presents scores from Table 5. The total score is simply an average of the two previous scores.

As was the case with sciences and engineering, The University of British Columbia comes first overall, with a score of 98.84, ahead of McGill (92.26) and Toronto (81.83). Alberta is fourth at 77.52, followed by Montreal (including HEC) and Guelph with nearly identical scores (76.60 and 76.35, respectively).

In the social sciences and humanities, the dominance of the U-15 is somewhat less than it is in sciences and engineering. Of the top ten universities in this field, four are from outside the U-15 (Guelph, York, Concordia and Simon Fraser). On the other hand, the top scores are restricted to schools with large enrolments; there is no equivalent to Rimouski's performance in science in this field. The best small university performance is that of Trent, in 18th.

Table 6: Overall scores

| Rank | Institution | H-Index | Funding | Total | Rank | Institution | H-Index | Funding | Total |
|------|-----------------------|---------|---------|-------|------|-------------------------|---------|---------|-------|
| 1 | UBC | 100.00 | 97.67 | 98.84 | 32 | UQ Trois-Rivieres | 41.09 | 32.95 | 37.02 |
| 2 | McGill | 84.52 | 100.00 | 92.26 | 33 | UBC - Okanagan | 44.18 | 29.24 | 36.71 |
| 3 | Toronto-St. George | 86.89 | 76.77 | 81.83 | 34 | Mount Saint Vincent | 43.82 | 27.53 | 35.68 |
| 4 | Alberta | 71.12 | 83.91 | 77.52 | 35 | Lakehead | 33.78 | 36.94 | 35.36 |
| 5 | Guelph | 68.50 | 84.19 | 76.35 | 36 | Brandon | 34.24 | 30.93 | 32.59 |
| 6 | Montreal | 64.55 | 86.08 | 75.32 | 37 | Acadia | 35.27 | 28.46 | 31.86 |
| 7 | Mcmaster | 70.78 | 79.66 | 75.22 | 38 | Ryerson | 37.59 | 25.60 | 31.59 |
| 8 | York | 69.06 | 71.51 | 70.29 | 39 | UNB | 34.68 | 26.78 | 30.73 |
| 9 | Concordia | 64.23 | 70.08 | 67.15 | 40 | Thompson Rivers | 35.82 | 20.96 | 28.39 |
| 10 | SFU | 68.09 | 60.78 | 64.44 | 41 | Regina | 33.59 | 26.32 | 29.96 |
| 11 | Queen's | 79.56 | 48.95 | 64.25 | 42 | UNBC | 32.02 | 26.78 | 29.40 |
| 12 | Waterloo | 66.91 | 47.15 | 57.03 | 43 | UQ Montreal | 37.77 | 20.88 | 29.32 |
| 13 | Calgary | 55.51 | 57.79 | 56.65 | 44 | Moncton | 27.88 | 29.51 | 28.70 |
| 14 | Dalhousie | 52.24 | 55.94 | 54.09 | 45 | Winnipeg | 32.31 | 24.74 | 28.53 |
| 15 | Carleton | 58.66 | 43.88 | 51.27 | 46 | Sherbrooke | 30.71 | 24.50 | 27.61 |
| 16 | Toronto - Scarborough | 60.31 | 42.20 | 51.26 | 47 | UQ Chicoutimi | 25.08 | 25.76 | 25.42 |
| 17 | Trent | 63.29 | 33.42 | 48.36 | 48 | Lethbridge | 40.84 | 9.87 | 25.35 |
| 18 | Western | 52.72 | 42.13 | 47.42 | 49 | Saint Mary's University | 30.36 | 18.34 | 24.35 |
| 19 | Toronto - Mississauga | 61.86 | 32.44 | 47.15 | 50 | Fraser Valley | 30.26 | 18.43 | 24.34 |
| 20 | Ottawa | 43.86 | 48.26 | 46.06 | 51 | Athabasca | 26.53 | 20.79 | 23.66 |
| 21 | Laval | 34.65 | 55.93 | 45.29 | 52 | St. Thomas | 33.15 | 12.28 | 22.72 |
| 22 | Saskatchewan | 54.72 | 35.62 | 45.17 | 53 | St. FX | 26.71 | 16.10 | 21.41 |
| 23 | Manitoba | 56.86 | 31.46 | 44.16 | 54 | Cape Breton | 26.28 | 13.33 | 19.80 |
| 24 | Victoria | 52.33 | 35.27 | 43.80 | 55 | Laurentian | 29.05 | 9.31 | 19.18 |
| 25 | UOIT | 50.88 | 19.92 | 35.40 | 56 | Mount Allison | 24.28 | 12.30 | 18.29 |
| 26 | Windsor | 50.02 | 24.01 | 37.02 | 57 | OCAD | 9.83 | 23.01 | 16.42 |
| 27 | Wilfrid Laurier | 49.06 | 29.30 | 39.18 | 58 | Nipissing | 20.11 | 9.12 | 14.62 |
| 28 | Brock | 43.00 | 41.66 | 42.33 | 59 | Bishop's | 23.06 | 4.72 | 13.89 |
| 29 | UPEI | 45.35 | 39.26 | 42.31 | 60 | King's (NS) | 22.20 | - | 11.10 |
| 30 | Memorial | 41.93 | 42.13 | 42.03 | 61 | Royal Roads | 11.09 | 10.04 | 10.57 |
| 31 | UQ Rimouski | 37.43 | 43.00 | 40.22 | | | | | |

Conclusion—What These Rankings Tell Us

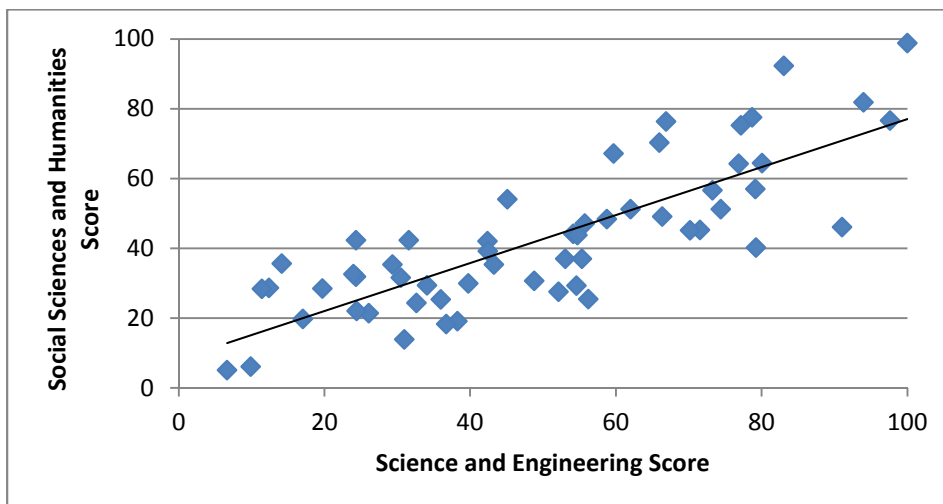
Table 7 recaps briefly the top ten in each of the two broad fields. The University of British Columbia comes a clear first in both. McGill and Toronto come in the top five in both categories; Montreal, Simon Fraser, Alberta and McMaster all make the top ten in both.

Table 7: Summary of results (top ten)

| Rank | Science and Engineering | Social Sciences and Humanities |
|------|-------------------------|--------------------------------|
| 1 | UBC | UBC |
| 2 | Montreal | McGill |
| 3 | Toronto - St. George | Toronto - St. George |
| 4 | Ottawa | Alberta |
| 5 | McGill | Guelph |
| 6 | Simon Fraser | Montreal |
| 7 | UQ Rimouski | McMaster |
| 8 | Waterloo | York |
| 9 | Alberta | Concordia |
| 10 | McMaster | Simon Fraser |

Strength in social sciences and humanities is generally correlated with strength in science and engineering. As Figure 3 shows, few institutions display strength in one but not the other. There are exceptions, of course; Rimouski, Ottawa and Chicoutimi have much better scores in NSERC disciplines than in SSHRC ones, but this is an artifact of the fact that so many of their social science and humanities publications are in French, where citations are less common. The only examples of schools with substantially better records in SSHRC disciplines than NSERC ones tend to be small, like UPEI or Bishop's.

Figure 3—Correlation of Scores by Broad Field of Study



Perhaps the main thing that has been learned in this exercise is that stripping away the effects of institutional size and field-normalizing bibliometrics and grant awards results in a slightly different picture of university performance than what we are used to. Big, research-intensive institutions still do well: UBC, McGill Montreal and Toronto still make up four of the top five spots in both broad science/engineering and social sciences/humanities. But there are some surprises nonetheless: Guelph cracks the top ten in social sciences, and Rimouski cracks the top ten in science, Simon Fraser makes the top ten in both and the U-15 do not by any means form a monopoly of the top spots in either field.

In other words, if one can be bothered to look behind the big, ugly institution-wide aggregates that have become the norm in Canadian research metrics, one can find some little clusters of excellence across the country that are deserving of greater recognition. If this publication has succeeded in providing Canadian policymakers with a slightly more nuanced view of institutional performance, then it will have served its purpose.

Appendix A—Technical Notes

Inclusion Criteria for Institutions

All universities in Canada were eligible for inclusion. For inclusion in the science and engineering rankings, an institution had to have a minimum of 30 academics working in these disciplines; for social sciences and humanities rankings, the minimum was set at 50 academics. These numbers used for these counts were sourced from the HiBAR database, which excludes emeriti, sessional instructors, adjuncts, and graduate students. It was not possible to confirm accurate faculty counts for Mount Royal University, and for University de Québec en Abitibi-Témiscamingue. For this reason, both these institutions have been intentionally excluded from this ranking.

Second, only faculty teaching in degree programs were included, on the rationale that research plays a much smaller role for faculty teaching professional short-term programs, including trades, certificates, and diploma programs. A few examples of excluded programs include Legal Administrative Assistant and Court Reporting. There were a small number of institutions at which these kinds of programs formed an extensive part of the program offerings, but where it was impossible to identify which professors taught in these programs. We chose to exclude four such institutions (Grant MacEwan University, Kwantlen Polytechnic University, Vancouver Island University, and Université de Saint-Boniface) for these reasons, as we felt that the resulting score would give an exaggeratedly weak picture of their existing research efforts.

Affiliated schools (e.g., Brescia, King's and Huron at Western) are reported as part of their parent institutions. Institutions with multiple campuses, where the secondary campus is essentially a single faculty (e.g., McGill's Macdonald campus in Ste. Anne de Bellevue, or Waterloo's Architecture campus in Cambridge) are reported as a single institution, as are institutions with multiple campuses where the faculty numbers at the secondary campus is too small to be included independently. Where an institution has multiple geographically separate multi-faculty campuses of sufficient size to be included (e.g., the University of Toronto campuses, or UBC-Okanagan), they are reported separately. The only exception to this rule is the University of New Brunswick, where, because of a problem with our own database of faculty members, we are unable to split the data properly. We apologize for this.

List of Disciplines

In order to perform field-normalization, it was necessary to classify all academics (or, more accurately, the departments for whom they worked), into one of a number of standardized disciplines. The disciplines used for this process are as follows:

| | | |
|---|---|---|
| <hr/> Agricultural sciences <hr/> | <hr/> | <hr/> |
| Agricultural biology | Electrical and computer engineering | Mathematics and statistics |
| Agricultural and food supply economics | Environmental engineering | Neuroscience |
| Agricultural and environmental studies | Geomatics | Physics, astrophysics, and astronomy |
| Food and nutritional sciences | Materials engineering | <hr/> Social Sciences <hr/> |
| Forestry | Mechanical engineering | Aboriginal Studies |
| Animal and Livestock Sciences | Ocean and naval engineering | Anthropology |
| Natural resources management | Physical engineering | Archeology |
| <hr/> Business <hr/> | Process engineering | Area studies |
| Accounting | Systems engineering | Canadian studies |
| Administration | <hr/> Fine arts <hr/> | Culture and communications |
| Business economics | Aboriginal fine arts | Criminology |
| Finance | Art history | Development Studies and Developmental Economics |
| Human resources | Dance | Economics |
| Information management | Film | Environmental Studies |
| International business | Music | Gender and women's studies |
| Management | Theater | Geography |
| Marketing | Visual arts | International Relations |
| Tourism | Graduate Studies | Linguistics |
| <hr/> Design and related disciplines <hr/> | <hr/> Humanities <hr/> | Political science |
| Architecture | Classics | Psychology |
| Environmental design | Cultural studies and related area studies | Public policy studies |
| Fashion design | English and literature | Religious studies |
| Industrial design | English Language Learning | Sociology |
| Interior design | History | Social work |
| Landscape design | International cultural studies | Theology |
| Marketing and advertising design | Other languages | <hr/> Other <hr/> |
| Urban planning and related disciplines | Philosophy | Education |
| <hr/> Engineering <hr/> | <hr/> Science <hr/> | Journalism |
| Aerospace engineering | Astronomy | Law |
| Biological engineering | Atmospheric science | Library sciences |
| Chemical engineering | Biology | |
| Civil engineering | Chemistry | |
| | Computer science | |
| | Environmental science | |
| | Geology | |

SSHRC and NSERC Funding Inclusion Rules

NSERC and SSHRC funding was based on annual data on award recipients that is made publicly available by both institutions. Award amounts included in the database reflect total amounts paid out in 2010, regardless of the original year of competition of the award, or the total amount of the award (thus only including the current year's fraction of multi-year awards). Award programs that can only be won by students or postgraduates were intentionally excluded (such as Vanier scholarships, the NSERC Postgraduate Scholarships Program, and SSHRC Doctoral Fellowships, for example). Institutional grants were included, with the one exception of the NSERC Major Resources Support program. While this award contributes to institutional research funding, the fact that it is distributed in massive one-time investments directed towards a narrow group of researchers gives it powerful influence over ranked outcomes, without indicating long-term research potential of the institution. For example, two awards totaling 19 million dollars was disbursed to the Canadian Light Source at the University of Saskatchewan in 2010. This constitutes more than half of all NSERC funding at U of S in 2010.

Awards that were excluded included:

SSHRC

- Banting Postdoctoral Fellowships
- CGS Michael Smith Foreign Study Supplements
- Doctoral Awards
- Joseph-Armand Bombardier CGS Master's Scholarships
- Sport Participation Research Initiative (Doctoral Supplements)
- Sport Participation Research Initiative (Research Grants)
- SSHRC Postdoctoral Fellowships
- Vanier Canada Graduate Scholarships
- President's Awards

NSERC

- Major Resources Support Program
- Aboriginal Ambassadors in the Natural Sciences and Engineering Supplement Program
- Environment Canada Atmospheric and Meteorological Undergraduate Supplements
- Undergraduate Student Research Awards
- Industrial Undergraduate Student Research Awards
- Alexander Graham Bell Canada Graduate Scholarships Program
- Michael Smith Foreign Study Supplements Program
- Industrial Postgraduate Scholarships Program
- NSERC Postgraduate Scholarships Program
- Summer Programs in Japan or Taiwan
- Vanier Canada Graduate Scholarships Program
- Banting Postdoctoral Fellowships Program
- Industrial R&D Fellowships Program

Japan Society for the Promotion of Science Postdoctoral Fellowships
Postdoctoral Fellowships Program
Postdoctoral Supplements
Visiting Fellowships in Canadian Government Laboratories Program

Appendix B—HiBAR Methodology

Over the course of eight months in fall 2011 and spring 2012, HESA developed the HiBAR database – a citation database containing the publication records of approximately 50,000 academic staff at Canadian institutions. This database contains both the current institution (and department) of employment of each scholar, and their publication record.

This database can be used to calculate normalized measures of academic impact. The process of building the HiBAR database and deriving normalized measures is discussed in detail in the following pages, and depicted visually on Page 2.

Process Summary

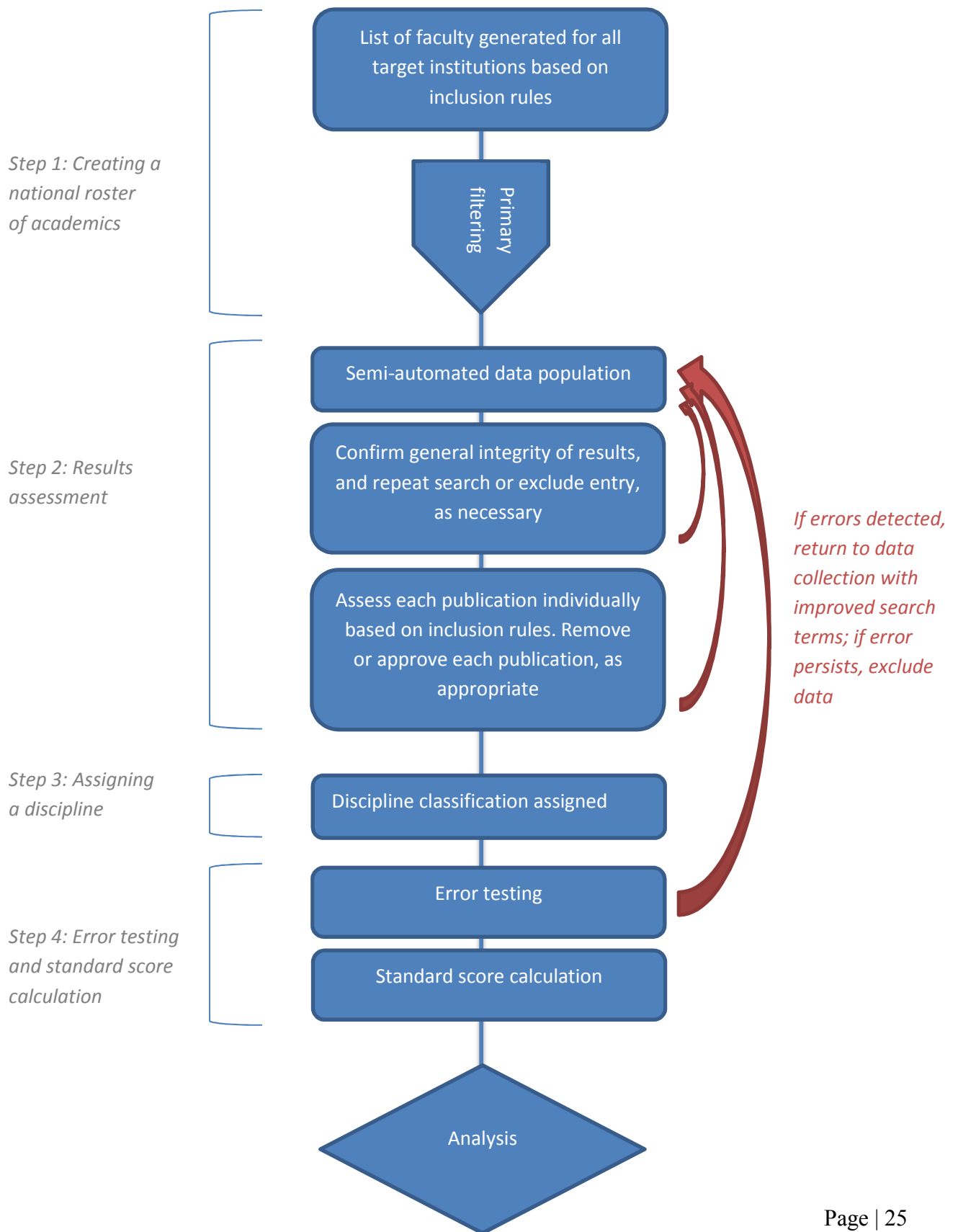
To determine disciplinary publication norms that can be used for discipline-normalization, HESA began by constructing a complete roster of academic staff at Canadian universities, using institution and department websites.

HESA then derived an H-index score for each academic by feeding each name into a program that uses Google Scholar to calculate an H-index value.

HESA then applied quality-control techniques (including manual review of every record) to reduce the number of false positives, correct metadata problems, and ensure that only desired publication types were included.

To confirm the data quality, H-index scores for each scholar were then tested for error.

Finally, scores for every faculty member were normalized by dividing raw H-index scores by the average score of the discipline in which each scholar is active, creating a measure of performance relative to the performance standards of each discipline. These normalized scores were then used to create institutional averages.



Step 1: Creating a national roster of academics

The first step was to generate a roster of academics that would be included in calculation of the norms. The first criterion for inclusion in the database was institutional: 78 universities were included, covering the vast majority of university academics in Canada. A number of small universities were excluded, due to difficulty building accurate staff lists.

Academic rosters were built by visiting the website for every department at each target institution and recording the names and position titles of all listed faculty. This was supplemented with institutional directories, and in some cases, by telephoning departments. Faculty members were included in a department if they were listed on that department's website at the time of collection (Summer 2011). The faculty list at this stage was designed to be as inclusive as possible, and to include all current faculty at each institution.

Because the HiBAR database is concerned primarily with staff that have an active role in both teaching and academic research at their institution, this list of faculty was then filtered to include only those faculty who could be reasonably assumed to have both a research and teaching role. Specifically, full time faculty were included, while sessional instructors, emeriti, instructors, clinical professors, and other staff were excluded.

When the position title was ambiguous, the faculty were *included*. For example, some position titles, such as "research chair" do not necessarily require a teaching role (researchers listed only as 'research chair' were included). Furthermore, a small number of institutions provide a list of teaching faculty but do not provide specific position titles. In most cases, these ambiguities were resolved by referring to additional sources or contacting the department in question. Overall, position titles were found for 87.4% of the names in the database, and non-ambiguous position titles were found for 72.7% of the names in the database (14.7% listed position titles that were ambiguous).

Included positions:

- Professors
- Assistant professors
- Lecturers*
- Instructors*
- Deans/associate deans
- Chairs/associate chairs
- Research chairs

Excluded positions:

- Administrative assistants
- Sessional lecturers
- Post doctorates
- Emeriti
- Adjunct professors
- Graduate students
- Visiting professors

*While this term is used at some institutions to describe academic faculty at an early stage of their career (and who were therefore included) at a small number of departments, lecturers and instructors have a teaching role but no research role. This was common in programs with a practicum or applied component, where these staff were technicians, laboratory assistants, or industry professionals. In these instances, lecturers and instructors were excluded.

The second set of criteria for inclusion was disciplinary. Non-academic disciplines (i.e., those that deliver programs of a primarily vocational nature, and which are mainly located in the newer universities in British Columbia) were excluded. So, too, was medicine due to the difficulty in distinguishing between academic and clinical faculty. Applied medical disciplines (such as kinesiology, veterinary medicine, and nursing) were included whenever enough information was available to separate them from medical faculties. Apart from those eliminated by these criteria, all academic staff at target institutions were included

Additional notes:

- Senior administrators were included only if they were listed as faculty on departmental websites.
- If a faculty member was cross-posted (i.e., listed on two separate websites, but not listed as an adjunct in either), they were listed as a faculty in *both* departments.
- When conflicting position title information was encountered, the information listed on the departmental website was assumed to be correct.
- Note that the HiBAR database tends to include slightly more faculty than are reported by statistics Canada (~4.5%).

Step 2: Results assessment

Each name in the database was then used as a search term in Google Scholar to generate a list of publications written by the author in question. The resulting list of publications was then added to a staging database in order to facilitate the process of manually reviewing publication data. This was functionally equivalent to searching for the author's name in the "author" field of Google Scholar's advanced search function and recording the results.

Manual review is necessary because automated data collection processes produce false positives. This is due to a limited ability of software to distinguish between different authors sharing the same name, and sometimes working in the same discipline. Authors with very common names can have bibliometric scores that are inflated as publications by similarly-named authors are falsely attributed. Furthermore, some publications appear more than once in Google Scholar's list of results, duplicating their citation counts or splitting citations for a single paper between two entries. For some types of searches, these problems can cause serious issues for automated data collection process.

Google Scholar results were manually reviewed by HESA staff, to ensure that:

1. The search term used accurately reflects the name used by the researcher in his or her publications. If a difference was found, the search term was corrected. If necessary, Boolean logic was used to include alternate spellings.
2. Publications written by similarly named researchers are excluded. Publications written by other authors were excluded from the database.
3. The articles, books and other publications included are only counted once. All duplicates were combined, maintaining an accurate total of unique citations.

4. Only desired publication types are included. This includes peer-reviewed articles, conference proceedings, books, and scholarly articles from non-peer reviewed sources. It excludes non-scholarly publications such as news articles and patents.
5. A valid number of results were returned. A very small number of researchers (<100) had names that were so common that the search returned 1000 publications (the maximum that Google Scholar will return), each with at least one citation. In these cases, it is possible that core publications (those that affect an individual's H-index) were not returned in the results. In these cases, the search terms were modified in order to narrow the results, but if this failed to reduce the number of results, these individuals were excluded from the database. Less than 100 scholars nation-wide were excluded for this reason.
6. The scholar in question was correctly assessed by the filter criteria in Step 1. If not, the entry was flagged and excluded from the database.

While a manual assessment methodology does not eliminate all errors, it dramatically reduces their incidence. Most importantly, by eliminating cases of high over-attribution, it increases the accuracy of this tool when used to compare groups of researchers.

Additional notes:

- HESA staff used a variety of resources to assess and remove false positives, including CVs, descriptions of research and publication lists on departmental websites, and the personal websites of researchers.

Step 3: Assigning a discipline classification

In order to normalize by discipline, the HiBAR database needed to identify the discipline in which each individual worked. Each entry was manually reviewed in order to assign a discipline code to each faculty. These codes identify both the trunk discipline, and the specific sub discipline of each researcher. A total of six disciplines and 112 sub-disciplines were identified. Interdisciplinary researchers and cross-appointed staff could be assigned multiple discipline codes. HESA staff manually reviewed the publication record, department of employment, and stated research objectives (if available) in order to choose the most appropriate discipline classifications.

Step 4: Error testing and standard score calculation

Next, results were spot-tested by senior staff to test for errors, and were analysed in aggregate to ensure that bias was not introduced into the process by the methodology. Specific sources of bias that were tested include: which staff member performed the analysis, the error detection and data exclusion processes, and the month in which data was collected (as the data collection and analysis process was distributed over six months). Where errors were identified in a batch of entries, data was purged and the data collection and assessment processes were repeated. Systemic bias was not detected. After error testing, data is moved from the staging database to the analysis database.

Finally, a standardized score was calculated for each individual. Average H-indexes can vary enormously from one discipline to another even within a broad field of study like “Science.” Math/stats and environmental science both have average H-indexes below seven, while in astronomy and astrophysics, the average is over 20. Simply counting and averaging professorial H-indexes at each institution would unduly favour those institutions that have a concentration in disciplines with more active publication cultures.

The HiBAR database controls for differences in publication disciplines by calculating “standardized H-index scores.” These are derived simply by dividing every individual’s H-index score by the average for the sub-discipline discipline in which they are classified. Thus, someone with an H-index of 10 in a discipline where the average H-index is 10 would have a standardized score of 1.0, whereas someone with the same score in a discipline with an average of five would have a standard score of 2.0. This permits more effective comparisons across diverse groups of scholars because it allows them to be scored on a common scale while at the same time taking their respective disciplinary cultures into account.

These were then used to calculate averages of standard scores for each group of researchers analyzed in the report. The average standard scored reported at the institutional level (or any other group of scholars) averages the standard scores of researchers at that institution, effectively creating a weighted average that accounts for disciplinary differences within the group.

For example, the group of scholars below is first given a standard score that normalizes their H-index, and then that standard score is averaged to find the group score.

| | H-index | Average H-index of scholar’s discipline | Standard score | Standard score (Group average) |
|-----------|---------|---|----------------|--------------------------------|
| Scholar 1 | 5 | 5 | 1 | 2 |
| Scholar 2 | 8 | 4 | 2 | |
| Scholar 3 | 3 | 1 | 3 | |

With this calculation, the average score across an entire discipline will always be one. A scholar who scores above one has a higher H-index than the average of other researchers in the same discipline. A group of scholars with an average above one either has higher-scoring scholars, more scholars with above-average scores, or both.

Additional notes:

- Scholars who were excluded for any of the reasons above were excluded from both the numerator and denominator in all calculations

Annex (Released October 26, 2012)

Following the publication of this report, we received a substantial amount of feedback on the results. Critiques tended to centre on the staff counts included in Tables 1 and 4 which were felt to be much too high. As a result, there was some concern that the results might be fundamentally unsound.

The reason for these high counts was two-fold:

- 1) The HiBAR system automatically double-counts cross-posted staff. This is a feature, rather than a bug. The entire point of field-normalized rankings is that every professor must be scored against the standards of his or her discipline; if they have more than one discipline, their results must be normalized twice. We do not take a single H-index score and divide it across two observations; instead, we calculate someone's normalized H-index twice and then average them.

Say Professor Smith, with an H-index of 4, is cross-posted between discipline A (where the average H-index is 5) and discipline B (average H-index = 3). This person's normalized score would be .8 (4/5) in discipline A and 1.33 (4/3) in discipline B. When aggregating to the institutional level, both scores are included but due to averaging this person would "net out" at $(.8+1.33)/2 = 1.065$. If they were only counted once, they would need to be assigned a score of either .8 or a 1.33, which doesn't seem very sensible.

We are confident that our methodology is fair and doesn't penalize anyone; however, we erred in presenting the data the way we did. The counts we presented were based on the number of individual normalized counts rather than the number of professors; we should have edited the numbers to reflect the actual number of individual professors.

- 2) Though the original totals excluded adjunct faculty, they included part-time faculty. Our reasoning for this was fairly simple: part-time faculty are part of the institutional community and are presented as such to the world through institutional websites. A number of people suggested that some institutions' results might change (read: improve) significantly if part-time professors were excluded.

As a result of these concerns, we decided to re-run our analysis. There was no need to account for the first critique as it was a matter of presentation rather than substance; however, we felt it would be a useful exercise to restrict the comparison to full-time professors, if only to see how in fact the presence of part-time professors might change the analysis.

The results of this new analysis are presented in the following pages. Tables 7 through 12 follow exactly the same pattern as Tables 1 to 6; to examine the differences, simply compare Table 7 to Table 1, Table 8 to Table 2, etc.

Of the four basic charts (NSERC H-index and funding, SSHRC H-index and funding), the NSERC H-index table is the one that changes the least. This is because there are not all that many part-time professors in

science, and those that are tend to have research profiles which are relatively similar to those that are full-time. The top eight are all in identical spots in both tables; Dalhousie experiences the biggest positive change, moving up from 32nd to 26th.

The NSERC funding ranking (Tables 2 and 8) shows significantly more movement. In the original rankings, UBC was in first place, followed relatively closely by Ottawa and Montreal. With part-timers excluded, it is no longer close – Montreal falls to third, Ottawa to eighth, and the gap between UBC and second-place Alberta is very large. Manitoba and Dalhousie do much better once part-timers are excluded; U of T's Scarborough and Mississauga campuses do much worse.

The SSHRC H-index rankings (Tables 4 and 10) show more changes than their NSERC equivalents, in that UBC's advantage over other institutions is not nearly so pronounced. However, the top ten institutions remain the same, though a couple of institutions do switch spots within that ten. The big changes all occur among institutions with large francophone components: Laval jumps from 40th to 28th, UQ Montreal from 34th to 25th and Ottawa from 28th to 21st. These institutions' faculties of arts and social sciences clearly both use part-timers on a different scale to other schools, and their part-timers have a different profile (i.e., one more similar to adjuncts) than part-timers at other universities.

The SSHRC funding ranking (Tables 5 and 11) show significant change as well. As in the NSERC rankings, the gap between the top institution (McGill) and others widens substantially. Laval climbs into the top ten at the expense of York, UQAM again shows an enormous leap in performance (from 47th to 16th), and as in the NSERC funding rankings, the performance of the two smaller U of T campuses drops off significantly.

The net result of these changes are as follows: on the NSERC-discipline rankings, UBC retains top spot with an even larger margin. Toronto (St. George) moves into second and Rimouski drops five spots to 12th. The biggest change in rankings are for Toronto-Scarborough, which falls from 12th to 28th, and Manitoba, which jumps from 27th to 17th. The SSHRC discipline rankings see more change – UBC loses top spot to McGill because of the change in the funding rankings and there is a very significant jump for UQAM (from 43rd to 17th). Laval (21st to 14th) and Ottawa (20th to 15th) also see important increases.

The bigger picture here, though, is that for most institutions the change of frame changes very little. To understand why this is so, it is important to understand the difference in methodology between this study and other research rankings such as that created by *Research Infosource*. In other rankings, institutional totals of things like funding are created, and per-professor totals are derived simply by dividing that total by the total number of professors. In those rankings, reducing the number of professors is important because a smaller denominator means a higher score. This ranking looks at the scores of each and every individual professor and averages them. The effect of including or excluding part-time professors has nothing to do with total numbers and everything to do with their *average* profile. For an institution's score to change, the research profile of the average part-time professor compared to that of the average full-time professor must be significantly different than it is at other institutions. Simply put, there are very few institutions where this is true.

Table 7: Science and engineering discipline-normalized bibliometric (H-index) scores, alternative methodology

| Rank | Institution | Count | Mean Standardized Score | Points | Rank | Institution | Count | Mean Standardized Score | Points |
|------|---------------------|-------|-------------------------|--------|------|---------------------|-------|-------------------------|--------|
| 1 | UBC | 556 | 1.51 | 100.00 | 29 | Memorial | 341 | 0.79 | 52.26 |
| 2 | Toronto-St. George | 799 | 1.51 | 99.97 | 30 | Windsor | 177 | 0.71 | 47.18 |
| 3 | Montréal | 170 | 1.40 | 92.74 | 31 | UBC-Okanagan | 99 | 0.71 | 46.84 |
| 4 | McGill | 586 | 1.37 | 90.52 | 32 | UQ Chicoutimi | 70 | 0.70 | 46.35 |
| 5 | Simon Fraser | 319 | 1.30 | 86.40 | 33 | Saint Mary's | 60 | 0.67 | 44.11 |
| 6 | Waterloo | 649 | 1.26 | 83.28 | 34 | Bishop's | 37 | 0.66 | 43.54 |
| 7 | Ottawa | 247 | 1.25 | 82.99 | 35 | Sherbrooke | 262 | 0.65 | 42.76 |
| 8 | York | 251 | 1.24 | 82.24 | 36 | Laurentian | 125 | 0.62 | 40.94 |
| 9 | Laval | 361 | 1.14 | 75.25 | 37 | New Brunswick | 276 | 0.61 | 40.22 |
| 10 | McMaster | 421 | 1.12 | 74.10 | 38 | Wilfrid Laurier | 65 | 0.59 | 38.85 |
| 11 | Queen's | 354 | 1.11 | 73.58 | 39 | Lakehead | 146 | 0.58 | 38.41 |
| 12 | UQ Rimouski | 72 | 1.09 | 72.42 | 40 | UOIT | 91 | 0.57 | 37.85 |
| 13 | Toronto-Scarborough | 113 | 1.05 | 69.39 | 41 | Mount Allison | 43 | 0.56 | 37.07 |
| 14 | Manitoba | 389 | 1.05 | 69.33 | 42 | Lethbridge | 170 | 0.55 | 36.58 |
| 15 | Trent | 72 | 1.05 | 69.25 | 43 | ETS | 137 | 0.54 | 35.77 |
| 16 | UQ Trois-Rivieres | 100 | 1.04 | 68.89 | 44 | Regina | 118 | 0.54 | 35.53 |
| 17 | Alberta | 640 | 1.03 | 67.96 | 45 | Brandon | 34 | 0.49 | 32.18 |
| 18 | Concordia | 243 | 1.01 | 67.10 | 46 | St. Francis Xavier | 90 | 0.47 | 30.93 |
| 19 | Western | 284 | 1.01 | 66.79 | 47 | Ryerson | 239 | 0.46 | 30.22 |
| 20 | UQ Montreal | 193 | 0.99 | 65.70 | 48 | UPEI | 75 | 0.42 | 27.96 |
| 21 | Calgary | 336 | 0.99 | 65.46 | 49 | Mount Saint Vincent | 27 | 0.39 | 25.95 |
| 22 | Saskatchewan | 399 | 0.87 | 57.72 | 50 | Winnipeg | 107 | 0.36 | 23.90 |
| 23 | Guelph | 455 | 0.85 | 56.49 | 51 | Acadia | 82 | 0.35 | 23.04 |
| 24 | Toronto-Mississauga | 55 | 0.84 | 55.79 | 52 | Cape Breton | 33 | 0.26 | 17.47 |
| 25 | Victoria | 390 | 0.84 | 55.41 | 53 | Brock | 79 | 0.25 | 16.31 |
| 26 | Dalhousie | 395 | 0.82 | 54.09 | 54 | Moncton | 100 | 0.23 | 15.39 |
| 27 | UNBC | 49 | 0.81 | 53.74 | 55 | Thompson Rivers | 82 | 0.22 | 14.43 |
| 28 | Carleton | 252 | 0.81 | 53.45 | | | | | |

Table 8: Science and engineering discipline-normalized funding scores, alternative methodology

| Rank | Institution | Average of Normalized Total Funding | Points | Rank | Institution | Average of Normalized Total Funding | Points |
|------|--------------------|-------------------------------------|--------|------|---------------------|-------------------------------------|--------|
| 1 | UBC | 1.74 | 100 | 29 | UQ Montreal | 0.78 | 44.83 |
| 2 | Alberta | 1.49 | 85.13 | 30 | New Brunswick | 0.75 | 42.74 |
| 3 | Montréal | 1.41 | 80.75 | 31 | UBC-Okanagan | 0.73 | 41.96 |
| 4 | Calgary | 1.37 | 78.82 | 32 | Lethbridge | 0.69 | 39.40 |
| 5 | Toronto-St. George | 1.35 | 77.20 | 33 | ETS | 0.64 | 36.74 |
| 6 | Simon Fraser | 1.34 | 76.84 | 34 | Toronto-Scarborough | 0.61 | 35.18 |
| 7 | Laval | 1.31 | 75.30 | 35 | Brock | 0.61 | 34.68 |
| 8 | Ottawa | 1.28 | 73.18 | 36 | Toronto-Mississauga | 0.59 | 33.94 |
| 9 | Guelph | 1.27 | 72.62 | 37 | Athabasca | 0.59 | 33.89 |
| 10 | Rimouski | 1.24 | 70.97 | 38 | Mount Allison | 0.58 | 33.43 |
| 11 | McGill | 1.23 | 70.57 | 39 | UQ Trois-Rivieres | 0.57 | 32.90 |
| 12 | Saskatchewan | 1.23 | 70.53 | 40 | Saint Mary's | 0.56 | 32.05 |
| 13 | Waterloo | 1.22 | 69.78 | 41 | Memorial | 0.53 | 30.17 |
| 14 | McMaster | 1.19 | 68.11 | 42 | Wilfrid Laurier | 0.51 | 29.11 |
| 15 | Windsor | 1.13 | 64.70 | 43 | St. Francis Xavier | 0.48 | 27.31 |
| 16 | Queen's | 1.09 | 62.26 | 44 | Laurentian | 0.45 | 25.77 |
| 17 | Sherbrooke | 1.09 | 62.25 | 45 | Ryerson | 0.44 | 24.96 |
| 18 | UQ Chicoutimi | 1.02 | 58.53 | 46 | Mount Saint Vincent | 0.39 | 22.32 |
| 19 | Carleton | 0.96 | 54.83 | 47 | Acadia | 0.35 | 20.24 |
| 20 | Regina | 0.96 | 54.79 | 48 | UNBC | 0.33 | 18.69 |
| 21 | Dalhousie | 0.94 | 54.02 | 49 | Winnipeg | 0.32 | 18.08 |
| 22 | UOIT | 0.93 | 53.03 | 50 | UPEI | 0.29 | 16.85 |
| 23 | Manitoba | 0.90 | 51.68 | 51 | Lakehead | 0.28 | 16.17 |
| 24 | Trent | 0.90 | 51.42 | 52 | Cape Breton | 0.19 | 11.14 |
| 25 | Victoria | 0.89 | 51.20 | 53 | Brandon | 0.19 | 11.12 |
| 26 | York | 0.86 | 49.55 | 54 | Moncton | 0.15 | 8.42 |
| 27 | Western | 0.86 | 49.45 | 55 | Thompson Rivers | 0.13 | 7.65 |
| 28 | Concordia | 0.78 | 44.89 | | | | |

Table 9: Total normalized scores (natural sciences and engineering), alternative methodology

| Rank | Institution | H-index | Funding | Total Score | Rank | Institution | H-index | Funding | Total Score |
|------|---------------------|---------|---------|-------------|------|-----------------------|---------|---------|-------------|
| 1 | UBC | 100 | 100 | 100 | 29 | UQ Trois-Rivieres | 68.89 | 32.9 | 50.89 |
| 2 | Toronto-St. George | 99.97 | 77.2 | 88.58 | 30 | UOIT | 37.85 | 53.03 | 45.44 |
| 3 | Montréal | 92.74 | 80.75 | 86.74 | 31 | Regina | 35.53 | 54.79 | 45.16 |
| 4 | Simon Fraser | 86.40 | 76.84 | 81.62 | 32 | Toronto-Mississauga | 55.79 | 33.94 | 44.86 |
| 5 | McGill | 90.52 | 70.57 | 80.54 | 33 | UBC-Okanagan | 46.84 | 41.96 | 44.40 |
| 6 | Ottawa | 82.99 | 73.18 | 78.08 | 34 | New Brunswick | 40.22 | 42.74 | 41.48 |
| 7 | Alberta | 67.96 | 85.13 | 76.54 | 35 | Memorial | 52.26 | 30.17 | 41.21 |
| 8 | Waterloo | 83.28 | 69.78 | 76.53 | 36 | Saint Mary's | 44.11 | 32.05 | 38.07 |
| 9 | Laval | 75.25 | 75.3 | 75.27 | 37 | Lethbridge | 36.58 | 39.4 | 37.99 |
| 10 | Calgary | 65.46 | 78.82 | 72.14 | 38 | ETS | 35.77 | 36.74 | 36.25 |
| 11 | UQ Rimouski | 72.42 | 70.97 | 71.69 | 39 | UNBC | 53.74 | 18.69 | 36.21 |
| 12 | McMaster | 74.10 | 68.11 | 71.10 | 40 | Mount Allison | 37.07 | 33.43 | 35.24 |
| 13 | Queen's | 73.58 | 62.26 | 67.92 | 41 | Wilfrid Laurier | 38.85 | 29.11 | 33.98 |
| 14 | York | 82.24 | 49.55 | 65.89 | 42 | Laurentian | 40.94 | 25.77 | 33.35 |
| 15 | Guelph | 56.49 | 72.62 | 64.55 | 43 | Bishop's | 43.54 | 17.12 | 30.33 |
| 16 | Saskatchewan | 57.72 | 70.53 | 64.10 | 44 | St. Francis Xavier | 30.93 | 27.31 | 29.11 |
| 17 | Manitoba | 69.33 | 51.68 | 60.50 | 45 | Ryerson | 30.22 | 24.96 | 27.59 |
| 18 | Trent | 69.25 | 51.42 | 60.33 | 46 | Lakehead | 38.41 | 16.17 | 27.29 |
| 19 | Western | 66.79 | 49.45 | 58.12 | 47 | Brock | 16.31 | 34.68 | 25.49 |
| 20 | Windsor | 47.18 | 65.7 | 56.44 | 48 | Mount Saint Vincent | 25.95 | 22.32 | 24.14 |
| 21 | Concordia | 67.10 | 44.89 | 55.90 | 49 | UPEI | 27.96 | 16.85 | 22.41 |
| 22 | UQ Montreal | 65.70 | 44.83 | 55.26 | 50 | Brandon | 32.18 | 11.12 | 21.65 |
| 23 | Carleton | 53.45 | 54.83 | 54.14 | 51 | Acadia | 23.04 | 20.24 | 21.64 |
| 24 | Dalhousie | 54.09 | 54.02 | 54.05 | 52 | Winnipeg | 23.90 | 18.08 | 20.99 |
| 25 | Victoria | 55.41 | 51.2 | 53.30 | 53 | Cape Breton | 17.47 | 11.14 | 14.30 |
| 26 | Sherbrooke | 42.76 | 62.25 | 52.50 | 54 | Université de Moncton | 15.39 | 8.42 | 11.90 |
| 27 | UQ Chicoutimi | 46.35 | 58.53 | 52.43 | 55 | Thompson Rivers | 14.43 | 7.65 | 11.04 |
| 28 | Toronto-Scarborough | 69.39 | 35.18 | 52.28 | | | | | |

Table 10: Social sciences and humanities bibliometric (H-index) scores, alternative methodology

| Rank | Institution | Count | Mean Standardized | | Rank | Institution | Count | Mean Standardized | |
|------|---------------------|-------|-------------------|--------|------|-------------------|-------|-------------------|--------|
| | | | Score | Points | | | | Score | Points |
| 1 | UBC | 842 | 1.71 | 100 | 31 | UPEI | 116 | 0.78 | 45.45 |
| 2 | McGill | 719 | 1.64 | 95.39 | 32 | UBC-Okanagan | 146 | 0.77 | 45.20 |
| 3 | Toronto-St. George | 1157 | 1.63 | 95.14 | 33 | UQ Trois-Rivieres | 223 | 0.75 | 43.85 |
| 4 | Queen's | 482 | 1.45 | 84.57 | 34 | Lethbridge | 302 | 0.74 | 43.34 |
| 5 | Alberta | 619 | 1.34 | 78.42 | 35 | Memorial | 389 | 0.73 | 42.84 |
| 6 | Guelph | 309 | 1.31 | 76.40 | 36 | Thompson Rivers | 152 | 0.69 | 40.16 |
| 7 | York | 1027 | 1.31 | 76.29 | 37 | UQ Rimouski | 124 | 0.64 | 37.29 |
| 8 | Simon Fraser | 693 | 1.29 | 74.96 | 38 | Ryerson | 587 | 0.63 | 36.74 |
| 9 | McMaster | 419 | 1.28 | 74.45 | 39 | Acadia | 146 | 0.63 | 36.56 |
| 10 | Waterloo | 447 | 1.24 | 72.27 | 40 | New Brunswick | 299 | 0.63 | 36.48 |
| 11 | Concordia | 569 | 1.22 | 71.36 | 41 | Winnipeg | 268 | 0.62 | 36.45 |
| 12 | Toronto-Mississauga | 265 | 1.17 | 68.19 | 42 | Lakehead | 188 | 0.62 | 36.20 |
| 13 | Trent | 211 | 1.16 | 67.60 | 43 | St. Thomas | 113 | 0.62 | 35.99 |
| 14 | Montréal | 742 | 1.11 | 64.97 | 44 | Brandon | 132 | 0.61 | 35.87 |
| 15 | Toronto-Scarborough | 251 | 1.11 | 64.91 | 45 | UNBC | 127 | 0.61 | 35.74 |
| 16 | Calgary | 589 | 1.06 | 62.10 | 46 | Regina | 323 | 0.61 | 35.41 |
| 17 | Western | 732 | 1.06 | 62.06 | 47 | Sherbrooke | 411 | 0.60 | 34.74 |
| 18 | Carleton | 549 | 1.06 | 62.04 | 48 | Saint Mary's | 254 | 0.59 | 34.57 |
| 19 | Manitoba | 521 | 1.05 | 61.30 | 49 | Fraser Valley | 111 | 0.55 | 32.10 |
| 20 | Saskatchewan | 443 | 1.04 | 60.73 | 50 | Moncton | 181 | 0.54 | 31.22 |
| 21 | Ottawa | 808 | 0.97 | 56.45 | 51 | St. FX | 163 | 0.52 | 30.44 |
| 22 | Victoria | 758 | 0.96 | 55.98 | 52 | Laurentian | 265 | 0.49 | 28.57 |
| 23 | Dalhousie | 354 | 0.95 | 55.42 | 53 | Mount Allison | 135 | 0.46 | 27.09 |
| 24 | UOIT | 71 | 0.95 | 55.31 | 54 | Athabasca | 89 | 0.45 | 26.37 |
| 25 | UQ Montreal | 880 | 0.90 | 52.22 | 55 | King's (NS) | 83 | 0.44 | 25.45 |
| 26 | Windsor | 315 | 0.89 | 52.14 | 56 | Cape Breton | 97 | 0.43 | 24.98 |
| 27 | Wilfrid Laurier | 420 | 0.87 | 51.01 | 57 | Bishop's | 108 | 0.42 | 24.63 |
| 28 | Laval | 645 | 0.85 | 49.67 | 58 | UQ Chicoutimi | 139 | 0.39 | 22.46 |
| 29 | Mount Saint Vincent | 125 | 0.81 | 47.07 | 59 | Nipissing | 178 | 0.36 | 21.14 |
| 30 | Brock | 418 | 0.79 | 46.37 | 60 | Royal Roads | 240 | 0.20 | 11.50 |

Table 11: Social sciences and humanities discipline-normalized funding scores, alternative methodology

| Rank | Institution | Mean Standardized | | Rank | Institution | Mean Standardized | |
|------|--------------------|-------------------|--------|------|---------------------|-------------------|--------|
| | | Score | Points | | | Score | Points |
| 1 | McGill | 2.55 | 100 | 31 | Manitoba | 0.64 | 25.22 |
| 2 | UBC | 2.12 | 82.97 | 32 | Toronto-Scarborough | 0.64 | 25.11 |
| 3 | Montréal | 1.88 | 73.61 | 33 | Mount Saint Vincent | 0.63 | 24.74 |
| 4 | McMaster | 1.70 | 66.78 | 34 | UQ Chicoutimi | 0.63 | 24.68 |
| 5 | Guelph | 1.68 | 65.86 | 35 | Windsor | 0.63 | 24.61 |
| 6 | Alberta | 1.61 | 63.13 | 36 | UOIT | 0.62 | 24.32 |
| 7 | Simon Fraser | 1.39 | 54.37 | 37 | Wilfrid Laurier | 0.61 | 23.75 |
| 8 | Toronto-St. George | 1.37 | 53.81 | 38 | Saskatchewan | 0.59 | 23.03 |
| 9 | Laval | 1.34 | 52.65 | 39 | Regina | 0.57 | 22.51 |
| 10 | Concordia | 1.31 | 51.48 | 40 | Toronto-Mississauga | 0.57 | 22.32 |
| 11 | Calgary | 1.23 | 48.25 | 41 | Sherbrooke | 0.53 | 20.85 |
| 12 | York | 1.21 | 47.44 | 42 | Ryerson | 0.53 | 20.85 |
| 13 | Queen's | 1.21 | 47.28 | 43 | Acadia | 0.51 | 20.07 |
| 14 | Ottawa | 1.12 | 43.89 | 44 | Winnipeg | 0.51 | 20.03 |
| 15 | Dalhousie | 1.11 | 43.42 | 45 | UBC-Okanagan | 0.47 | 18.36 |
| 16 | UQ Montreal | 1.10 | 43.25 | 46 | Thompson Rivers | 0.47 | 18.32 |
| 17 | UQ Rimouski | 1.02 | 39.85 | 47 | Brandon | 0.46 | 18.00 |
| 18 | Waterloo | 0.93 | 36.26 | 48 | Saint Mary's | 0.42 | 16.37 |
| 19 | Western | 0.91 | 35.58 | 49 | Cape Breton | 0.33 | 12.94 |
| 20 | Brock | 0.84 | 32.87 | 50 | St. Thomas | 0.32 | 12.50 |
| 21 | Memorial | 0.81 | 31.63 | 51 | St. Francis Xavier | 0.27 | 10.76 |
| 22 | UQ Trois-Rivieres | 0.79 | 31.08 | 52 | Nipissing | 0.22 | 8.72 |
| 23 | Carleton | 0.78 | 30.56 | 53 | Laurentian | 0.21 | 8.42 |
| 24 | Victoria | 0.73 | 28.60 | 54 | Mount Allison | 0.20 | 8.02 |
| 25 | UPEI | 0.71 | 27.80 | 55 | Royal Roads | 0.20 | 7.80 |
| 26 | UNB | 0.69 | 27.23 | 56 | Lethbridge | 0.20 | 7.74 |
| 27 | Moncton | 0.69 | 27.00 | 57 | Bishop's | 0.15 | 6.04 |
| 28 | Lakehead | 0.67 | 26.26 | 58 | King's (NS) | 0.10 | 4.02 |
| 29 | UNBC | 0.67 | 26.12 | 59 | Fraser Valley | 0.03 | 1.10 |
| 30 | Trent | 0.66 | 26.01 | 60 | Athabasca | 0.01 | 0.51 |

Table 12: Overall scores, alternative methodology

| Rank | Institution | H-index | Funding | Total Score | Rank | Institution | H-index | Funding | Total Score |
|------|---------------------|---------|---------|-------------|------|---------------------|---------|---------|-------------|
| 1 | McGill | 95.39 | 100 | 97.70 | 31 | Wilfrid Laurier | 51.01 | 23.75 | 37.38 |
| 2 | UBC | 100 | 82.97 | 91.49 | 32 | Memorial | 42.84 | 31.63 | 37.24 |
| 3 | Toronto-St. George | 95.14 | 53.81 | 74.48 | 33 | UPEI | 45.45 | 27.8 | 36.62 |
| 4 | Guelph | 76.40 | 65.86 | 71.13 | 34 | Mount Saint Vincent | 47.07 | 24.74 | 35.91 |
| 5 | Alberta | 78.42 | 63.13 | 70.77 | 35 | New Brunswick | 36.48 | 27.23 | 31.86 |
| 6 | McMaster | 74.45 | 66.78 | 70.61 | 36 | UBC-Okanagan | 45.20 | 18.36 | 31.78 |
| 7 | Montréal | 64.97 | 73.61 | 69.29 | 37 | Lakehead | 36.20 | 26.26 | 31.23 |
| 8 | Queen's | 84.57 | 47.28 | 65.93 | 38 | UNBC | 35.74 | 26.12 | 30.93 |
| 9 | Simon Fraser | 74.96 | 54.37 | 64.66 | 39 | Thompson Rivers | 40.16 | 18.32 | 29.24 |
| 10 | York | 76.29 | 47.44 | 61.86 | 40 | Moncton | 31.22 | 27 | 29.11 |
| 11 | Concordia | 71.36 | 51.48 | 61.42 | 41 | Regina | 35.41 | 22.51 | 28.96 |
| 12 | Calgary | 62.10 | 48.25 | 55.17 | 42 | Ryerson | 36.74 | 20.85 | 28.80 |
| 13 | Waterloo | 72.27 | 36.26 | 54.26 | 43 | Acadia | 36.56 | 20.07 | 28.32 |
| 14 | Laval | 49.67 | 52.65 | 51.16 | 44 | Winnipeg | 36.45 | 20.03 | 28.24 |
| 15 | Ottawa | 56.45 | 43.89 | 50.17 | 45 | Sherbrooke | 34.74 | 20.85 | 27.79 |
| 16 | Dalhousie | 55.42 | 43.42 | 49.42 | 46 | Brandon | 35.87 | 18 | 26.93 |
| 17 | Western | 62.06 | 35.58 | 48.82 | 47 | Lethbridge | 43.34 | 7.74 | 25.54 |
| 18 | UQ Montreal | 52.22 | 43.25 | 47.73 | 48 | Saint Mary's | 34.57 | 16.37 | 25.47 |
| 19 | Trent | 67.60 | 26.01 | 46.81 | 49 | St. Thomas | 35.99 | 12.5 | 24.25 |
| 20 | Carleton | 62.04 | 30.56 | 46.30 | 50 | UQ Chicoutimi | 22.46 | 24.68 | 23.57 |
| 21 | Toronto-Mississauga | 68.19 | 22.32 | 45.26 | 51 | St. Francis Xavier | 30.44 | 10.76 | 20.60 |
| 22 | Toronto-Scarborough | 64.91 | 25.11 | 45.01 | 52 | Cape Breton | 24.98 | 12.94 | 18.96 |
| 23 | Manitoba | 61.30 | 25.22 | 43.26 | 53 | Laurentian | 28.57 | 8.42 | 18.49 |
| 24 | Victoria | 55.98 | 28.6 | 42.29 | 54 | Mount Allison | 27.09 | 8.02 | 17.56 |
| 25 | Saskatchewan | 60.73 | 23.03 | 41.88 | 55 | Fraser Valley | 32.10 | 1.1 | 16.60 |
| 26 | UOIT | 55.31 | 24.32 | 39.81 | 56 | Bishop's | 24.63 | 6.04 | 15.34 |
| 27 | Brock | 46.37 | 32.87 | 39.62 | 57 | Nipissing | 21.14 | 8.72 | 14.93 |
| 28 | UQ Rimouski | 37.29 | 39.85 | 38.57 | 58 | King's (NS) | 25.45 | 4.02 | 14.74 |
| 29 | Windsor | 52.14 | 24.61 | 38.37 | 59 | Athabasca | 26.37 | 0.51 | 13.44 |
| 30 | UQ Trois-Rivieres | 43.85 | 31.08 | 37.47 | 60 | Royal Roads | 11.50 | 7.8 | 9.65 |

