Using the IPEDS Peer Analysis System in Peer Group Selection

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Abstract

Compared to traditional classification methods, developing a peer group using the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data Systems (IPEDS) data allows institutions to add comparative dimensions, to update the peer group, and to track changes at peer institutions over time. Peer selection and comparisons can become dynamic processes. The development of a peer group is especially important as Canadian institutions attempt to set operational or performance benchmarks by looking at U.S. institutions. The purpose of this study is to develop a U.S. peer group for a Canadian university—Brock University in St. Catharines, Ontario—by adopting a hybrid approach using statistics and judgment. As a result of this approach, a total of 20 U.S. institutions were selected as similar to Brock University based on size, enrollment intensity, student mix, research activity, and program mix. To provide guidance to other universities wishing to develop a peer group, this paper describes the steps taken in the peer

selection process and shares the lessons learned during the research process.

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INTRODUCTION

Canada and the United States share many commonalities in the field of higher education. Exchanges of students and faculty frequently occur between higher education institutions in both countries. Collaborations and exchanges between higher education research professionals are also common. There is a great need for mutual understanding and learning between the two countries, both at the postsecondary system level and among individual institutions. The government of the Province of Ontario has recently announced a significant increase in quality improvement funding for postsecondary education over the next five years. As part of this new quality initiative,

all 18 Ontarian universities have agreed to participate in the National Survey of Student Engagement (NSSE), the Consortium for Students Retention Data Exchange (CSRDE), and the Graduate and Professional Students Survey (GPSS). These surveys and the data exchange were developed and are administered by U.S. higher education research professionals with many U.S. postsecondary institutions participating. The Ontario universities will use the results from the surveys and the data exchange to position themselves with and, more importantly, to benchmark themselves against similar institutions. It is important, therefore, for the institutional researchers at the Ontario universities to help their institutions develop peer groups of U.S. institutions.

Brock University participated in NSSE in 2006. As part of the report of the survey results, NSSE provides an online tool for participating institutions to select their comparison groups. One base for comparison

group selection is the new 2005 Carnegie Classification, which includes criteria on Basic Classification and five additional institutional descriptors. The new Carnegie Classification added the five specific institutional descriptors to capture various dimensions of postsecondary education institutions. For example, an institution can be classified as a *High Undergraduate, Very High Undergraduate*, or a *Major Undergraduate* institution on the "Enrollment Profile" descriptor based on the proportion of undergraduates over the total student enrollment. Detailed information on the Carnegie Classifications is available at their website (Carnegie Foundation for the Advancement of Teaching, 2005).

While each U.S. institution has been classified on each of the six institutional descriptors, Canadian and other non-U.S. institutions must do their own calculations to locate themselves in the Carnegie scheme. Table 1 shows the result of such an effort for Brock University.

Table 1

Brock University's Carnegie Classification

Classification	Category
Basic Classification	Master's colleges and universities (large program)
Undergraduate Instructional Program	Balanced arts and science/professions, some graduate coexistence
Graduate Instructional Program	Post-baccalaureate, comprehensive
Enrollment Profile	Very high undergraduate
Undergraduate Profile	Full-time four-year, selective, lower transfer-in
Size and Setting	Large four-year, primarily non-residential

Using information from the above table as a reference, the next step was to use the online tool provided by NSSE to find a U.S. comparison group among the NSSE participating institutions. A number of queries were made on a combination between the Basic Classification and one or more of the other five institutional descriptors. The only query that yielded a reasonable number (15) of institutions in the comparison group for Brock is the one made on a combination among Basic Classification (= Master's L), Graduate Instructional Program Description (= Post-baccalaureate, comprehensive), and Enrollment Profile (= Very high undergraduate). A further check of these 15 institutions indicated that there were great differences among them. For example, Brock had 16,600 students in the fall of 2004; enrollment at two of the 15 institutions was over 30,000; and seven institutions had less than 10,000 students. Previous studies have indicated that institutional size is an important selection criterion in peer group development, so it is not appropriate to regard all of these institutions as Brock's peer institutions. Because of this, the decision was made to develop a U.S. peer group using a different methodology. This methodology was selected based on several considerations.

First, our major purpose for selecting a comparison group was for NSSE comparisons.

What we need is a peer group of institutions that are sufficiently similar in mission, programs, size, students, etc. The methodology needed to allow us to add more institutional descriptors.

Second, the methodology needs to use data that are as current as possible. The major data source that Carnegie used in classifying institutions was the NCES IPEDS for 2004, so changes in institutional characteristics since 2004 are not reflected in the Carnegie categories. Using current IPEDS data to identify peers enables us to use the most recent data available and to update the peer group as updates become available. Using current data is especially important for Brock University. We are a relatively young institution (43 years old), and we are evolving toward our goal to become a comprehensive university; therefore, change has been and will be an institutional phenomenon. For example, we have developed many new graduate programs since 2004 and will continue to do so in the next few years. Using the most recent IPEDS data to identify our peer group makes it possible for us to capture not only our own changes, but also other institutions' changes.

Finally, the methodology needs to allow us to select a focused group of institutions. The Carnegie Classifications yield too many institutions in a comparison group, and the number needs to be reduced; it

is difficult to make appropriate refinements because it is not possible to distinguish close peers from distant peers in the group. On the other hand, if an appropriate algorithm based on institutional data is used, we are able to measure institutions on a continuum. As a result, we are able to distinguish among close peers and distant peers and, therefore, develop a peer group with a reasonable number of institutions.

The IPEDS Peer Analysis System (PAS) includes tools designed to allow users to select a comparison group according to certain criteria and to create customized IPEDS dataset with data from each institution in the comparison group. (For a detailed introduction to the PAS, see http://nces.ed.gov/ipedspas/userHelp/overview.asp and http://nces.ed.gov/ipedspas/userHelp/toc.asp. Also see the AIR/NCES training materials under "Data Analysis Tools.")

LITERATURE REVIEW

To offer guidance to other Canadian universities wishing to develop a peer group, this paper describes an effort to develop a U.S. peer group for a Canadian university. The effort requires an understanding of the institutional data reported in IPEDS from the U.S. higher education institutions and an acknowledgement of some comparability issues between the two postsecondary education systems.

Comparison and emulation are often key factors in institutional strategic planning. Comparative data can act as benchmarks for assessing the well-being of an institution and can enable an institution to identify areas in need of improvement (Lang, 1999; Teeter & Brinkman, 1992). Meaningful comparisons hinge upon a successful peer selection process. Teeter and Brinkman (1992) identified four types of comparison groups: competitor, aspirational, predetermined, and peer. Predetermined groups can be further differentiated as natural, traditional, jurisdictional, and classification-based. Among the four types of groups, only a peer group consists of institutions that are similar in role and scope of mission. Although classification-based groups might include similar institutions, they are usually based on only a few comparative dimensions and, as a result, they may contain too much within-group variation (Teeter & Brinkman, 1992). A peer group is defined as a set of peer institutions that are sufficiently similar in mission, programs, size, students, etc. (Ingram, 1995).

Although the development and effective implementation of peer comparisons involves both technical and political considerations (Teeter & Brinkman, 1992; Weeks, Puckett, & Daron, 2000), the role of the institutional researcher is to bring analytic rigor to an otherwise politically charged context (Ingram, 1995). Since other stakeholders may not appreciate or understand the complex methodologies, it is important for institutional researchers to strike a balance between simplicity and usefulness.

Teeter and Brinkman (1992) developed a typology of the most popular methodologies in peer selection ranging from statistical approaches to those that depend entirely on judgment (see Table 2).

Each of the methodologies has its pros and cons. Cluster Analysis is characterized by heavy reliance on multivariate statistics, which are very complex in nature, but the advantage is that it handles a large number of institutional descriptors. On the other end, Panel Review is simple because it is based upon the consensus of knowledgeable individuals, but is often suspect because of its unscientific foundation (Teeter & Brinkman, 1992). The Threshold Approach is simple. It sets an allowable range for specific attributes, but within each range there may be great differences among individual institutions. For example, the descriptor for "Size and Setting" in the new Carnegie Classification is about size. Any institution with over 10,000 undergraduate FTEs is put into the "Large" category, but within this group, there are institutions with over 30,000 students in contrast to institutions enrolling just over 10,000 students.

Several scholars highly recommend the Hybrid Approach to forming peer groups because it incorporates

Table 2

A Typology of *Methodologies* for Developing Peer Groups

Emphasis			
Data & Statistics	Data, Statistics & Judgment	Data & Judgment	Judgment
Cluster Analysis	Hybrid Approach	Threshold Approach	Panel review
Technique			

From Teeter and Brinkman (1992, pp. 68).

both the benefits of expert judgment and the advantage of data and statistics (Ingram, 1995; Lang, 1999; Zhao & Dean, 1997). For Canadian institutions wishing to select peers among the U.S. institutions, Lang (1999) recommends using the Hybrid Approach because it is not "so statistically intricate that it is incomprehensible." And the major area of subjective judgment—the identification of selection variables and the possible assignment of variable weights—is clearly visible, and thereby open to further review and discussion, as necessary.

The review of literature confirmed that the type of comparison group that Brock University needed for NSSE benchmarking was a peer group of institutions that are sufficiently similar in mission, programs, size, etc. Following the recommendation of scholars

in the field, the Hybrid Approach was adopted: During the initial screening stage, the Threshold Approach was adopted and allowable ranges were set for key variables. In the variable selection phase, experts in the field were extensively consulted (Panel Review). In the final phase, standardized distance measures were used—a technique implemented in Cluster Analysis.

PROCEDURES

The steps taken in the peer development process included (a) initial data screening, (b) variable selection, (c) peer data file construction and second data screening, (d) Brock's own institutional profile construction, and (e) statistical calculations. Although each step was separately reported, the author did go back as the learning

about the data and variables in a later stage allowed for improvement of what had been done at a previous step.

Step One: Initial Threshold Screening

Since more than 6,600 postsecondary institutions report to NCES on the IPEDS, initial screening was necessary to reduce the pool. This sets thresholds for the key variables. Table 3 displays the criteria applied in the selection. Using the PAS, 136 institutions were selected in the initial screening process.

Step Two: Variable Selection

The choice of selection variables was based on the experiences of previous researchers (Ingram, 1995; Lang, 1999; Zhao & Dean, 1997) as well as on the availability of statistical

Table 3

Initial Data Screening

Variable	Criteria
Level of Institution	Four or More Years
Degree Granting Status	Degree Granting
Control of Institution	Public
Carnegie Classification (2000)	Master's Colleges and Universities (I & II)
Historically Black College or University	No
Tribal College	No
Total Student Headcount	7,000–25,000

data. Although this study was triggered by problems in peer identification using the new (2005) Carnegie Classifications, a thorough review of these new classifications and of the data source file provided by the Carnegie Foundation provided valuable information. For example, student FTEs were calculated from reported full-time and part-time headcounts instead of using the FTEs reported in IPEDS. This is the same approach as adopted by the Carnegie Foundation. In addition to reviewing the information in the Carnegie report, the author consulted other experts in the field including staff working for the NCES on IPEDS, technical staff from the Carnegie Foundation, the Executive Director of the Association for Institutional Research, and a professor at the University of Toronto.

The following principles were applied in variable selection:

1. Use clearly defined variables with reliable data. There are data fields from IPEDS such as institutional-reported FTEs and IPEDS-estimated FTEs. Various experts who were consulted recommended not using the collected FTEs since different institutions have different definitions. Therefore, FTEs were calculated using the IPEDS definition: full-time headcount plus one-third of part-time headcount for the fall term.

2. Use percentages or ratios instead of absolute values where applicable. For example, the percentage of research expenditure over total operating expenditures was used instead of absolute research dollars, because of concerns over currency exchange rate fluctuations. This also helps to reduce the effect of differences in size.

3. Avoid duplicated or highly correlated measures. For example, it would be problematic to include both percentage of undergraduate and percentage of graduates in the descriptor variable list. Since either one varies only by the number of professional students, they provide almost identical information on student mix. Using both measures doubles the weight of student mix. Another variable frequently mentioned in previous studies was the percentage of women in the student population. This variable was not considered in the current project because program mix variables, such as the percentage of degrees in Education and the percentage of degrees in Humanities and Social Sciences, provide some measure of gender distribution among the student population.

Table 4 displays the results of the selection process.

According to Aldenderfer and Blashfield (1984), the choice of variables in peer selection is one of the most critical steps in the research process and should be guided by theory. Scholars in the field suggested that researchers describe the rationale for selecting characteristics because the specifications of peer institutions will vary widely depending on which characteristics are considered (Borden, 2005).

Size: Size matters. It is related to institutional structure, complexity, culture, finances, and other factors (Carnegie Foundation for Advancement of Teaching, 2005).

Enrollment Intensity: The differences in the proportions of undergraduate students to full-time and part-time status has implications for scheduling classes, student services, extracurricular activities, time to degree, and other factors. Part-time students tend to be older than full-time students, and older students bring more life experience and maturity into the classroom. This life experience is often accompanied by a greater zeal for learning compared with those who have not spent any appreciable time away from formal education. Older students also face special challenges related to the competing obligations of school, work, and family (Carnegie Foundation for Advancement of Teaching, 2005)

Table 4

Indicators and Variables

Indicator	Measure	Variables	Source
1. Size:	**FTE (FT Headcount + 1/3 PT Headcount)**	Total FT Headcount Total PT Headcount	
2. Enrollment Intensity	**% UG Headcount enrolled FT**	FT Degree-Seeking Undergraduate Total Degree-Seeking Undergraduate	
3. Student Mix	**% FTE students enrolled at the Graduate & First Professional level**	Graduate FT Graduate PT First Professional FT First Professional PT Undergraduate Degree Seeking FT Undergraduate Degree Seeking PT	Enrollment
4. Research Activity	**% Total Operating Expenditure for Research**	Research Expenditure Total Operating Expenditure	Finance
5. Program Mix*	**% of Bachelor's Degrees awarded in Humanities and Social Science** **% of Bachelor's Degrees awarded in Education** **% of Bachelor's Degrees awarded in Business** **% of Bachelor's Degrees awarded in Engineering** **% of Bachelor's Degrees awarded in Math and Science** **% of Bachelor's Degrees awarded in Health Related Disciplines** **% of Master's Degrees awarded in Education**	Degrees Awarded Total and By Discipline and by Level	Completions

Note: Programs & CIP Code (2000): Humanities & Social Sciences—03, 05, 09, 16, 19, 23, 24, 38, 42, 45, 50, 54; Education—13; Business—52; Engineering—14; Math and Sciences—11, 26, 27, 40; Health and Related Professions—51.

Student Mix: Student mix reflects important differences in educational mission as well as institutional climate and culture—differences that can have implications for infrastructure, services, and resource allocation.

Research Activity: Instruction, research, and public service are major functions of higher education institutions. The extent to which an institution focuses on each activity reflects a university's mission and cost structure.

Program Mix: The distribution of degrees by discipline is important because it has funding implications. For example, the cost of an engineering program may be greater than that of a social science program.

Indicators on performance, such as retention rate, were initially considered and explored. Due to a lack of comparable measures for "selectivity" between U.S. institutions and Canadian universities, retention rate was initially considered as a possible proxy for "selectivity." It was not selected mainly because of the concerns about the different dynamics of the two postsecondary systems in the U.S. and Canada. For example, there are great differences in student mobility because student transfers are much less common in Canadian institutions than in U.S. colleges and universities. A simple explanation is that there are a greater number of four-year colleges and universities in the U.S. (2,805 four-or-more year institutions) (NCES, n.d.) than in Canada (92 universities) (AUCC, n.d.), and the diversity in the U.S. higher education arena allows students more choices. Therefore, it was concluded that a comparison of retention and graduation rates on an institutional basis

between U.S. universities and Canadian universities will not yield meaningful and useful information.

Step Three: Construct Data Files and Second Data Screening

As noted during the initial screening, 136 institutions were selected. Using the PAS, a file was downloaded with data for these institutions on the selection variables as well as on additional variables. The data file was converted from a Comma-separated Variable (CSV) format into Excel and then into SPSS. The data file with all relevant variables and indicators of these institutions allows for a further check and screening. Institutions with missing data and "outlier" institutions with extreme values on selected variables were removed at this stage. Since the data on selection variables were converted to

z-scores in calculating similarity scores in the statistical phase, extreme values in the data would shift the mean values and increase the standard deviation. As a consequence, the results could be distorted. Table 5 displays details of the second screening process. The numerical criteria were set using a judgment process based on the comparisons with Brock University. For example, the percentage of undergraduates who were full-time at Brock was 79.3%. It was judged that having less than half of the undergraduate students as full-time would make an institution significantly different from Brock, and the two institutions with less than 50% of their undergraduates full-time were excluded. As a result of the screening, 79 institutions were kept for further analysis.

Step Four: Construct Brock's Own Institutional Profile

While original data for the set of institutions selected above were obtained directly from the IPEDS, Canadian institutions wishing to select U.S. peer institutions have to construct their own institution's profile by closely following the definitions and guidelines for IPEDS reporting. The following examples illustrate necessary considerations when constructing an institution's profile.

1. **Definition for Full-time Undergraduates:** For four-year U.S. institutions, a full-time undergraduate student is defined as a student taking at least 80% or above of a normal full course load in each term (source: http://www.nces.ed.gov/ipeds/glossary). At Brock University, as well as at many other Canadian universities,

Table 5
Second Institutional Screening

Number Removed	Criteria	Brock
2	% Undergraduates who are Full-Time <50%	79.3%
8	% of Students who are Graduate/ First Professional > 20%	5.1%
1	From Puerto Rico	No
28	Total FTE < 7,000	14,360
6	Missing value on Research Expenditures	
1	Missing value on Degree Completion	
3	% of Undergraduate Degrees in Engineering >10%	0%
7	% of Graduate Degrees in Engineering >10%	0%
1	Offers Law Degrees	No

Total Number of Institutions Removed: 57

undergraduate full-time or part-time status is defined based on an *individual course registration* for the whole Fall/Winter Session as compared to a *full course load* for the whole Fall/Winter Session. Undergraduate students registering for three courses or more (60% of the full course load of five full courses) are regarded as full-time students. The full-time/part-time status of Brock undergraduate students was recalculated using the definition from IPEDS.

2. **Time Frame for Degree Completion:** The IPEDS degree completion time frame is July 1 of one year to June 30 of the next year. Brock currently reports degrees awarded on a calendar year basis, so Brock's degree statistics were regenerated using the same time frame required by IPEDS (July to June).

3. **Mapping Degrees Awarded by Classification of Instructional Programs (CIP):** All IPEDS institutions report their degrees awarded information using the CIP developed by NCES. Using the Statistics Canada's crosswalk table between Specialization or Major Field of Study (SPEMAJ) codes and CIP codes as a guide, Brock University's degrees awarded information was mapped to fit the CIP scheme. Cautions were made for certain programs with multiple CIP codes. For example, Physical Education maps with several CIP codes, which represent different fields (such as education or parks, recreation, and fitness). Based on an understanding of Brock's

Physical Education program, the author mapped it into to the "parks, recreation, and fitness" category. For detailed information about the mapping, please visit Statistics Canada's website (http://www.statcan.ca/).

Step Five: Statistical Phase

According to Borden (2005), to determine the "nearest neighbor" institutions to a target institution, the proximity matrix is usually far more useful than the cluster analysis procedure. The selection variables are all continuous variables, so distance measures can be used in peer selection (Borden, 2005). Several prior studies (Lang, 1999; Weeks, Puckett, & Daron, 2000; Zhao & Dean, 1997) have adopted distance measures. There are two critical choices facing researchers in using distance measures: (a) whether or not to standardize the data and (b) whether or not to weigh variables. While standardization is controversial, Aldenderfer and Blashfield (1984) pointed out that researchers with substantially different units of measurement will undoubtedly want to standardize them, especially if a similarity measure (such as Euclidean distance) is to be used. In this study Euclidean distance is used and—while the majority of the variables are in percentages—the size indicator of FTE Students is not. Because of this, the variables were standardized.

The variables in the study were not weighted for the following

reasons: First, the indicators, such as size, that are deemed very important to the mission of a university had already been considered in the initial and second screening processes. It is reasonable to conclude that this factor had already received extra importance in comparison with other variables. Furthermore, scholars in the field indicate that it only makes sense to weigh a particular variable if "there are good theoretical reasons and there are well-defined procedures under which weighting can occur" (Aldenderfer & Blashfield, 1984, p. 22).

As mentioned, Euclidean distance, the most popular distance measure used in cluster analysis, was used to calculate the proximity to Brock University of each individual institution in the group. Euclidean distance is defined as *the square root of the sum of the squared differences between corresponding measures*. The formula is as follows:

$$d_{ij} = \sqrt{\sum_{k=1}^{p}(x_{ik} - x_{jk})^2}$$

d_{ij} — distance between case i and j
x_{ik} — the value of the kth variable for the ith case
x_{jk} — the value of the kth variable for the jth case
P — the number of variables

A proximity matrix, which contains the composite distance measure for each and every pair-wise combination of institutions, was created by using menus and options in the graphic user interface dialogues in PC

SPSS by choosing Analyze—Correlate—Distances (Between cases/Dissimilarity/Euclidean distance [z-scores]).The first column of the output matrix becomes the "distance" and needs to be sorted to get the group of nearest neighbors. It should be noted that this computation can also be done using Excel by standardizing the measures and then computing the Euclidian distance from the focus institution. This is the final mathematical step. For researchers wishing to select peer institutions, there is the judgmental step of deciding on the number of institutions in the peer group.

RESULTS

Table 6 lists the 20 peer institutions ranked by proximity to Brock University in based on the selection variables. The table provided Brock administrators data on all of the 11 selection variables and on 20 other variables that were not used in the selection process. The additional variables include data fields such as location and its level of urbanization, retention, number of full-time faculty, percentage of women, and total amount of operating expenses, etc. The inclusion of the additional variables allows campus administrators to evaluate and critique the results. Because of space limitations, Table 6 does not include all of the variables.

An inspection of Table 6 indicates that a typical peer

of Brock University has an FTE enrollment of 11,975, of which 8.7% are in graduate or first professional programs. Of its degree-seeking undergraduate students, 83% enroll as full-time. It employs 541 full-time faculty members and spends about 2.8% of its total U.S. $167,698,064 operating fund on academic research. The operating expenses per FTE student is U.S. $14,079. Of the bachelor's degrees awarded, 37.6% are in the field of Humanities and Social Sciences, 17.4% are in Education, 21.0% are in Business, 2.4% are in Engineering fields, 8.2% are in Math and Science, and 6.2% are in health-related fields. Of the master's degrees awarded, 41.8% are in Education.

A further comparison indicates that, generally, Brock University and its typical peer institution bear a strong resemblance. Brock does have a larger FTE student enrollment in comparison with its typical peer. The unique "double cohort" phenomenon was possibly caused by high school reform in Ontario, which allows both grade 11 and grade 12 high school students to enter postsecondary education at the same time. In other words, if it had not been for the "double cohort," Brock's FTE enrollment would have been much closer to its peer group average. The lower proportion of graduate-over-total enrollment and higher research-over-total operating expenditures signifies that Brock may have the potential to expand its graduate

enrollment since research is closely related to graduate education. The fact that Brock's expenditure per FTE student (Canadian $12,962) is lower than the peer average (U.S. $14,079) indicates that Brock University is under-funded in comparison to the U.S. peers as a group.

CONCLUSIONS

Using the IPEDS data in peer development allows institutions to add comparative dimensions to traditional classifications. It allows for future updates of a peer group and for tracking changes at peer institutions, so that peer selection and comparisons become a dynamic process. Each of the four methodologies in peer selection has pros and cons. The current study adopts a comprehensive or Hybrid Approach, with the Threshold Approach used in the screening process, expert comments (Panel Review) sought in variable selection process, and the distance measure technique in Cluster Analysis adopted in the statistical phase.

As a result of the initial selection process, 139 institutions were identified. After screening for outliers and missing data, 79 U.S. institutions were selected for further analysis. In the statistical phase, these 79 U.S. institutions were ranked according to the extent to which each institution was similar to Brock University, in size, enrollment intensity, student mix, research activity,

Table 6

Selected Institutional Descriptors of Brock and Its 20 Closest Peers

Institution Name	Similarity Score	FTE	% FT	% Gr.	% Rrch	% UG Hum/SS	% UG Edu.	% UG Busi.	% UG Engr.	% UG Sci	% Gr Edu
Brock University	0.000	14,360	79.3	5.1	8.5	34.9	25.5	10.9	0.0	7.6	46.7
Western Kentucky University	3.087	15,457	84.9	9.4	4.1	44.9	18.6	16.1	3.6	6.0	43.9
University of Central Oklahoma	3.479	12,359	71.8	6.8	4.0	37.6	12.1	28.2	1.5	9.5	46.7
Boise State University	3.776	13,577	68.6	5.9	5.0	37.3	9.0	21.9	4.5	8.5	41.9
Western Illinois University	3.854	11,857	91.5	10.3	2.6	41.9	13.8	12.8	2.4	6.8	56.3
Missouri State University	3.926	15,481	87.2	11.2	4.7	35.1	16.0	31.4	2.0	6.7	28.6
University of North Carolina-Wilmington	3.927	10,676	92.8	6.0	8.5	39.1	12.3	23.8	0.0	12.9	17.7
University of North Florida	4.025	11,848	72.3	8.7	4.1	36.7	10.4	24.0	4.3	7.7	38.4
Arkansas State University-Main Campus	4.098	8,512	82.3	8.1	4.8	27.5	18.2	18.9	5.0	11.4	37.5
University of Northern Iowa	4.099	11,137	88.7	8.7	1.2	40.5	18.4	22.9	3.0	7.4	36.8
Towson University	4.138	15,091	89.7	11.6	1.3	41.7	14.2	19.2	0.0	9.4	40.0
The University of West Florida	4.144	7,307	72.5	10.4	8.3	41.4	10.0	18.3	2.2	11.7	46.8
Eastern Illinois University	4.146	10,646	89.5	9.4	0.7	47.9	25.7	14.0	2.1	7.4	50.7
Saint Cloud State University	4.147	13,322	86.6	6.3	1.2	38.3	18.6	23.9	4.6	7.5	28.5
Eastern Michigan University	4.211	17,196	71.8	12.9	1.8	34.0	25.4	19.7	2.9	6.9	29.3
Kennesaw State University	4.243	14,160	68.4	6.9	0.5	28.8	20.1	25.7	0.0	11.9	40.7
University of Wisconsin-Oshkosh	4.285	9,750	89.4	6.6	0.9	41.0	16.7	19.8	0.0	5.9	50.5
West Chester University of Pennsylvania	4.298	11,236	93.3	10.0	0.3	42.8	17.4	16.3	0.0	5.8	41.0
Appalachian State University	4.325	13,376	94.8	7.7	0.5	40.6	17.9	21.7	3.0	5.2	55.9
Northeastern State University	4.386	7,684	75.0	7.9	1.6	23.6	29.2	21.0	4.0	7.8	41.0
Valdosta State University	4.431	8,825	83.5	8.6	0.2	31.3	23.1	20.0	2.4	7.0	63.9
Mean		11,975	82.7	8.7	2.8	37.6	17.4	21.0	2.4	8.2	41.8
Standard Deviation		2,757	9.1	2.0	2.5	6.1	5.5	4.5	1.7	2.3	10.9

Rank	Institution Name	CITY*	ST.*	LOCATION*	Retn.*	Operating Expense**	% Fm ale*	% Gr. Busi. *	# FT-Fac*
0	Brock University	ST. CATHARINES	ON	Mid-Size City	90	$186,130,000	61.1	31.7	545
1	Western Kentucky University	BOWLING GREEN	KY	Large Town	73	$202,121,101	59.8	4.8	686
2	University of Central Oklahoma	EDMOND	OK	Urban Fringe of Large City	64	$102,422,594	59.4	18.9	411
3	Boise State University	BOISE	ID	Mid-Size City	61	$208,577,533	54.3	15.4	571
4	Western Illinois University	MACOMB	IL	Small Town	79	$205,843,872	50.7	12.0	632
5	Missouri State University	SPRINGFIELD	MO	Mid-Size City	73	$194,769,603	57.0	26.3	728
6	University of North Carolina-Wilmington	WILMINGTON	NC	Mid-Size City	83	$163,846,214	59.7	27.4	493
7	University of North Florida	JACKSONVILLE	FL	Large City	75	$148,431,714	59.0	33.8	449
8	Arkansas State University-Main Campus	STATE UNIVERSITY	AR	Rural	65	$136,774,039	60.1	16.1	447
9	University of Northern Iowa	CEDAR FALLS	IA	Mid-Size City	80	$212,054,930	58.3	13.1	597
10	Towson University	TOWSON	MD	Urban Fringe of Large City	82	$218,612,152	63.8	7.1	663
11	The University of West Florida	PENSACOLA	FL	Mid-Size City	74	$133,122,975	60.4	19.2	332
12	Eastern Illinois University	CHARLESTON	IL	Small Town	81	$173,835,600	58.5	11.7	605
13	Saint Cloud State University	ST CLOUD	MN	Mid-Size City	71	$145,212,000	55.3	13.5	516
14	Eastern Michigan University	YPSILANTI	MI	Urban Fringe of Large City	73	$269,247,299	60.8	25.5	769
15	Kennesaw State University	KENNESAW	GA	Urban Fringe of Large City	74	$145,123,510	61.5	39.6	551
16	University of Wisconsin-Oshkosh	OSHKOSH	WI	Mid-Size City	76	$127,607,643	60.8	38.0	385
17	West Chester University of Pennsylvania	WEST CHESTER	PA	Urban Fringe of Large City	84	$158,094,957	63.4	8.5	527
18	Appalachian State University	BOONE	NC	Small Town	86	$224,802,369	52.1	6.8	703
19	Northeastern State University	TAHLEQUAH	OK	Small Town	67	$78,896,328	61.7	12.3	325
20	Valdosta State University	VALDOSTA	GA	Large Town	76	$104,564,837	61.0	2.2	435
	Mean				75	$167,698,064	58.9	17.6	541
	Standard Deviation				6.9	$48,449,397	3.5	10.9	132

Note: * Not used in the forming the peer group.

** Operating Expenses for Brock are in Canadian dollars and for other universities are in U.S. dollars.

and program mix. Twenty institutions were identified as Brock University's closest peers. A comparison between Brock and the peers (both as individual institutions and as a whole group) was conducted. Additional variables besides those used in the selection process were listed to provide more background information about each institution.

IPEDS contains data on various dimensions of an institution's operation, such as finances, student aid, staff, etc. Potentially, peer group data can be used to conduct comparative studies on issues like student-faculty ratio, faculty and staff compensation, tuition and fees, or student aid. Caution needs to be exercised, however, when conducting comparative analysis. For example, the standard on reporting finance data has changed in recent years, and the currency exchange rates between U.S. dollars and Canadian dollars have fluctuated in recent years. To deal with the difference in currency, Lang and Zha (2004) recommended using the "purchasing power parity" algorithm devised by the Organization for Economic Cooperation and Development (OECD) to adjust currency differences.

As stated at the beginning of this article, peer development is a critical step in establishing performance benchmarks. A number of U.S. institutions participate in national surveys, such as NSSE, and some

Canadian institutions have started to participate as well. There is a great need for comparisons and benchmarking. The survey results from the participants in the peer group developed in this study—a subset of the peer group—can be used to establish benchmarks for Brock University.

The above analysis provided a solid foundation for making the initial peer selections; however, many researchers and practitioners in the field acknowledge that selecting peer institutions is also a political process (Teeter & Brinkman, 1992). Depending on how comparative data are used, discussions with campus administrators and other internal and external constituents will now be conducted at Brock in the final peer selection process.

Some lessons learned in the process of developing a U.S. peer group for Brock University are outlined below.

First, differences exist in data specifications and definitions of variables. Some of these are how full-time and part-time students are defined, how degree completion time frames are calculated, and how each academic discipline is defined. To address this comparability issue, Brock University's data were reconstructed and many relative measures, such as percentages, were used instead of absolute values.

Second, since the outcome of the analysis depends greatly on the selection variables,

caution must be exercised when choosing institutional descriptors. Initially, retention rates were included in the selection variable as a proxy for selectivity—a widely used indicator in peer selection among the U.S. institutions. However, a further check on this variable indicated that the mean retention rate for U.S. institutions being identified as the "most selective" institutions is only 84%. Brock, fitting well within the "selective" category, maintains a retention rate of 90%. Because of different contexts between Brock and the U.S. institutions, the retention rate was dropped from the descriptor list. In addition, initially more graduate program variables based on discipline, such as percentage of master's degrees in Arts and Sciences, in Business, in Math and Science and other fields were included in the selection variable list. Because an overwhelmingly high proportion of enrollment at Brock, as well as at its peer institutions, is undergraduate, and because about half of Brock's master's degrees were awarded in Education, only the percentage of master's degrees in Education was retained as a descriptor variable.

Finally, although traditional classification, such as the Carnegie Classification, has its limitations, especially when applied in the Canadian context, the logic behind the classifications and the ways data were extracted from

national data sources are both useful to institutions wishing to develop their own peer groups through the use of a national database. Because the classification has credibility and name recognition, it will provide guidance as well as justification during the political dimensions of the process.

The peers in this study were selected based on general missions of higher education institutions. Depending on the particular comparisons an institution wishes to make, one may need to consider developing different "slates" of peers through assigning different weights to certain institutional descriptors. For the University of Toronto, besides the "Base" slate which is similar to the one developed for the current study, three other slates of peers were developed. For example, one of them was a "Research" slate, with indicators on research and library carrying more weights (Lang, 1999). Depending on institutional situations, even in the "Base" slate peer group development, the issue of weights deserves consideration.

Looking to the future, the procedures and methodologies established in this study can be adopted to develop peer Canadian institutions through using Statistics Canada's Postsecondary Student Information Systems (PSIS)[1] data.

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[1] The Postsecondary Student Information System (PSIS) was formerly the Enhanced Student Information Systems (ESIS).

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