A Comparative Analysis of Higher Education in the Buffalo Metropolitan Region

November 17, 2008

Final Report Submitted to the Western New York Consortium of Higher Education

by the University at Buffalo Regional Institute
The State University of New York

Regional Institute
University at Buffalo The State University of New York

Table of Contents

I. Executive Summary

The Buffalo metropolitan region's competitive advantage in the knowledge economy derives, in part, from the performance of its higher education sector in comparison to similar regions across the U.S. The region has a strong foundation in higher education, with a critical mass of institutions offering diverse degree programs. However, the region lacks objective analysis of the industry's ability to attract high-caliber students, provide them with a diverse, quality education, and then position its graduates within the region's knowledge economy. The Western New York Consortium of Higher Education commissioned the following comparative analysis to assess the performance of this industry against 12 competitor regions across the United States, shed light on relative strengths and identify areas in need of attention. Among the study's key findings are:

ATTRACTING diverse, high-performing students

- With seven students for every 100 persons, **the region earns its reputation as a college town**. It has a higher concentration of college students than many comparable regions including Seattle (four students per 100), Austin (five per 100) and Baltimore (six per 100).
- **Overall, the region's four-year schools are more selective than those of many peer regions,** with admittance rates lower than regions including Cleveland, Denver and Seattle.
- However, the **students the region attracts are not as academically strong;** median SAT scores of 1040-1260 lag those in most comparable regions.
- Moreover, **only 5 percent of college students in the region are out-of-state,** less than all but one peer region, including those where the major institution is a public university. Buffalo metro's two- and four-year schools also **fall below those in peer regions in attracting non-traditional students**, or those age 25 or older.
- **Finally, the region's higher education institutions are absent from key national rankings,** including the top-100 for undergraduate institutions and the top-25 for graduate programs in law, medicine, business and engineering.

EDUCATING for the knowledge economy

- **The Buffalo metro region's colleges and universities yield fewer "new economy" graduates compared to many peer regions.** One in four – or 24 percent – degrees granted by the region's colleges and universities is in a "new economy" field such as engineering, math, computers, health and the sciences. In comparison, Baltimore, Pittsburgh and Raleigh-Durham confer more than 30 percent of degrees in these fields. However, with 12 percent of new economy degrees conferred in the health sciences, Buffalo metro ranks fourth among peer regions, suggesting a potentially competitive advantage in drawing students to the region.

- **Higher education institutions in peer regions invest more in research compared to those in Buffalo metro.** Research universities and colleges in Baltimore, Raleigh-Durham and Pittsburgh spend more than $12,000 per student on research, compared to $4,300 per student in the Buffalo metro region. However, these three competitor regions have several universities

contributing to research innovation and patent development; Buffalo metro has only one (University at Buffalo).

- **Buffalo metro's schools attract fewer federal research dollars relative to peer region institutions.** Federal dollars support 52 percent of university research in Buffalo metro compared to more than 75 percent in Denver, Seattle, Cleveland and Rochester.

- **In academic patent generation, Buffalo metro outperforms many of its peers**, including Austin, Denver and Rochester, and is on par with Washington DC. However, companies in Buffalo metro struggle to innovate or capitalize on university innovations.

RETAINING graduates for the regional workforce

- **The actual rate of "brain drain" in the Buffalo metropolitan region does not match the common perception that the region is bleeding young professionals.** The region holds onto its young professional graduates at a rate similar to Baltimore, Raleigh-Durham, Philadelphia and Minneapolis, and does a better job retaining brains than Austin and Denver.

- Exceptionally affordable housing and short daily commutes to work help make t**he region an attractive place for young professionals to live and work.**

- However, **wages in the region are relatively low, even when adjusted for differences in cost of living in peer regions**, putting the region at risk of losing some college graduates to areas with a higher earning potential.

- **Buffalo metro's lack of professional "new economy" job opportunities could hinder graduate retention.** At 13 percent of total employment, the proportion of professional and technical jobs, including those in information, finance and insurance, is low compared to regions such as Washington DC, Denver and Austin, where these jobs account for 17-22 percent of total employment.

- Moreover, **self employment, one measure of a region's ability to foster innovation, accounts for a smaller portion of total employment in Buffalo metro than in all peer regions**.

- **Buffalo metro ranks lower than most peer regions on Forbes's list of "Best Places for Business and Careers."**

RECOMMENDATIONS for moving forward

ATTRACTING

- **Grow enrollment.** In the short-term, expand enrollment across all sectors, including out-of-state students and non-traditional students, by marketing the competitive advantages of higher education in Buffalo metro.

- **Increase institutions' competitiveness to attract better students.** Over the long-run, advance the region's placement in national rankings to attract students with stronger academic profiles.

EDUCATING

- **Leverage the life sciences.** The field of life sciences, including health and biological sciences, has the potential to anchor Buffalo metro in the new economy. The region's higher education institutions should continue to focus on increased enrollment and enhanced quality in life sciences programs.

- **Diversify investment in new economy fields.** Over the long-term, expand investments in the new economy fields of engineering, the physical sciences, and new media and arts programs. Efforts could include attracting and retaining distinguished faculty and securing research grants in these fields.

RETAINING

- **Promote region's affordability and high quality of life.** The region can immediately capitalize on its low cost of living and livability by emphasizing these selling points to upcoming graduates.

- **Tap potential of Buffalo metro natives' loyalty to region.** This cohort has strong ties to the area and is therefore the most likely to remain in the area following graduation. Build new economy capacity by encouraging these students to enroll in new economy degree programs.

- **Target students from outside regions in retention efforts.** Long-term focus also needs to be placed on recruiting and retaining students from outside the area, not only to spur new economy growth, but to build diversity and the region's "creative class."

- **Enhance entrepreneurial opportunities.** To diversify and increase the resilience of the region's knowledge-based economy, and thus the attractiveness of the region as a place to live and work, economic development efforts, in partnership with colleges and universities, should focus on increasing entrepreneurial activity.

II. Background

Forming the backbone of today's knowledge economy are higher education institutions that ready future members of the workforce with a diverse, enriching educational experience. These workers are drawn to communities with a high quality of life and robust economies with thick labor markets. In many respects, the region is well-positioned to succeed in the knowledge economy. Its nearly two dozen colleges and universities and their diverse academic programs draw approximately 100,000 students.[1] Moreover, the region is a vibrant place to live, study and work, offering world-class cultural attractions, quality neighborhoods, natural wonders and major league sports. However, to viably compete in this economy, a region's higher education institutions must be a cut above the rest in attracting a talented mix of students, providing high-quality education and ensuring its graduates find a place in the region's knowledge workforce.

The Western New York Consortium of Higher Education, an organization comprised of 22 colleges and universities in Erie, Niagara, Cattaraugus, Chautauqua, Allegany and Genesee Counties, initiated the *Better by Degrees* project to build understanding of the region's higher education industry and leverage the sector for regional progress. The Regional Institute, a research and public policy unit of the University at Buffalo, was commissioned to oversee the project. As part of *Better by Degrees*, the following analysis assesses the performance of the region's higher education sector against those of 12 comparable regions across the U.S. This benchmark analysis specifically gauges the Buffalo metropolitan region's higher education sector in terms of its ability to compete for talent, prepare students for employment in today's knowledge economy, and transition its young professional graduates into the regional economy. The report also offers recommendations based both on areas where the industry excels and can gain an edge over competitor regions, and on gaps in performance that demand attention.

[1] This number reflects total enrollment for consortium-member institutions. Aggregate data throughout this report reflect only two- and four-year institutions of higher education in the tri-county Buffalo CMSA (Erie, Niagara and Cattaraugus Counties). See Appendix D, Data Sources and Notes, for a list of colleges and universities within the Buffalo CMSA.

III. Scope and Methodology

The analysis presented in this report is based upon several fundamental choices and assumptions, including (1) defining and selecting the comparison regions, and (2) outlining the range of colleges and universities within each region for inclusion in this study.

This study compares the Buffalo metropolitan region's higher education sector to 12 knowledge economies from across the U.S.[2] The regions were selected for this comparative analysis based on a number of socio-demographic factors that align each with the Buffalo metropolitan region, including (i) population size, (ii) the size of the region's higher education sector, (iii) a historically large manufacturing base, (iv) the presence of a flagship public research university, and (v) a higher education sector deliberately collaborating to attract, engage and retain students **(Fig. 1)**. All two- and four-year, degree-granting institutions within each peer region were included in the study, as identified in the National Center for Education Statistics' database of higher education institutions.

Figure 1 – Peer Region Comparative Factors

Knowledge Economy	Population Size	# of Colleges & Universities	Rust Belt Location/Historically Large Manufacturing Base	Flagship University is Public Institution	Ongoing Collaborative Initiative
Rochester, CMSA	1,122,845	20	Yes	No: University of Rochester	Yes: Biz2Edu
Buffalo, CMSA	1,208,270	19	Yes	Yes: University at Buffalo	Yes: Better by Degrees
Louisville, CMSA	1,369,024	22	No	Yes: University of Louisville	No
Austin, MSA	1,598,161	18	No	Yes: University of Texas at Austin	No
Raleigh-Durham, CMSA	1,635,974	19	No	No: Duke University	No
Pittsburgh, CMSA	2,446,703	60	Yes	Yes: University of Pittsburgh	Yes: The College City
Baltimore, MSA	2,668,056	31	No	No: Johns Hopkins University	Yes: Baltimore Collegetown
Cleveland, CMSA	2,896,968	50	Yes	No: Case Western University	Yes: College360
Denver, CMSA	2,998,878	50	No	Yes: University of Colorado at Denver	No
Minneapolis-St. Paul, CMSA	3,538,781	67	Yes	Yes: University of Minnesota	No
Seattle, CMSA	4,038,741	52	No	Yes: University of Washington at Seattle	No
Washington, D.C. MSA	5,306,565	61	No	No: Georgetown University	No
Philadelphia, CMSA	6,385,461	105	Yes	No: University of Pennsylvania	Yes: Campus Philly

[2] The selected regions are defined by federal metropolitan designations, including Combined Metropolitan Statistical Areas and Metropolitan Statistical Areas. The Buffalo CMSA – referenced in this report as the Buffalo metropolitan region – is defined as Erie, Niagara and Cattaraugus Counties. Although this geographic area is smaller than the reach of the Western New York Consortium of Higher Education, whose member schools are based in Allegany, Cattaraugus, Chautauqua, Erie, Genesee and Niagara Counties, the use of census-defined areas allows for an accurate comparison among peer regions. Also, Baltimore and Washington, although part of the same single CMSA, were defined as separate MSAs to accommodate the request that both regions be included in this study as benchmark regions. See Appendix D, Data Sources and Notes, for a list of colleges and universities within the Buffalo CMSA.

IV. Findings: Benchmarking Higher Education in Buffalo Metro

a. ATTRACTING diverse, high-performing students

Clusters of educated and talented people foster a region's capacity for innovation and research—the foundation for success in today's knowledge economy. The foundation for Buffalo metro's knowledge economy is laid by the region's ability to attract a critical mass of diverse and academically strong students to its colleges and universities. The following data shed light on the region's performance in these areas.

Student Enrollment: A critical mass of university students in the region helps to ensure a diverse, thick supply of labor for the knowledge workforce, while also contributing to the region's "college town" appeal. **Buffalo metro earns its reputation as a college town based on its high concentration of college students.** There are seven full- and part-time students in the Buffalo metro region for every 100 persons living here **(Fig. 2).** Per capita enrollment matches that of Raleigh-Durham and Rochester, and exceeds the other 10 comparable knowledge regions, including Washington, Baltimore and Philadelphia.

Figure 2 – Per Capita Student Enrollment in Buffalo Metro Tops Peer Regions.

Metropolitan Area	Students Per 100 Population, 2006
Raleigh-Durham	7
Rochester	7
Buffalo	7
Washington, D.C.	6
Minneapolis-St. Paul	6
Baltimore	6
Denver	6
Pittsburgh	6
Philadelphia	6
Cleveland	5
Austin	5
Louisville	5
Seattle	4

Data Sources: National Center for Education Statistics and U.S. Census Bureau

Figure 3 – Total Student Enrollment in Buffalo Metro Lower than Peer Regions.

Metropolitan Area	# Students, 2006
Philadelphia	359,149
Washington, D.C.	342,326
Minneapolis-St. Paul	213,645
Denver	179,899
Baltimore	160,550
Seattle	155,139
Cleveland	144,510
Pittsburgh	139,204
Raleigh-Durham	117,125
Buffalo	81,749
Rochester	77,198
Austin	76,704
Louisville	64,611

Data Source: National Center for Education Statistics

However, in terms of total enrollment, Buffalo metro ranks 10th compared to its peer regions, suggesting the region still has room to grow enrollment to further leverage economic growth in the knowledge economy **(Fig. 3).**

Selectivity of Four-Year Schools: Selectivity in admissions can be an important measure of a university's ability to build a high-caliber student body.

Buffalo metro colleges and universities accept fewer applicants than most of its peer regions, including Denver, Seattle and Cleveland, suggesting the region's higher education sector is guided by more selective admissions (Fig. 4).

Additionally, the University at Buffalo, the region's largest research institution, has an admittance rate of 57 percent, which is lower than the regional average of 60 percent and approximately 10 percentage points below acceptance rates of such higher-ranked institutions as the University of Washington in Seattle and Case Western Reserve in Cleveland. At the same time, a review of median SAT scores for peer regions' largest research institution shows Buffalo metro is outperformed. The median SAT score for the University at Buffalo ranks above only Louisville's and Denver's major academic institution **(Fig. 5).**

Figure 4 – Average Acceptance Rates for Buffalo Metro Lower than Many Peer Regions.

Metropolitan Area	Acceptance Rate at Four-Year Colleges, 2006
Louisville	74%
Denver	74%
Seattle	69%
Cleveland	68%
Minneapolis-St. Paul	65%
Buffalo	60%
Austin	57%
Pittsburgh	56%
Philadelphia	53%
Rochester	52%
Washington, D.C.	51%
Raleigh-Durham	46%
Baltimore	45%

Data Source: National Center for Education Statistics

Figure 5 – Median SAT Scores for Buffalo Metro's Largest Research University Fall Below Those of Peer Regions.

Metropolitan Area	Institution	Median SAT Scores, 2008
Raleigh-Durham	Duke University	1340 - 1540
Philadelphia	University of Pennsylvania	1330 - 1520
Pittsburgh	Carnegie Mellon University	1310 - 1510
Washington, D.C.	Georgetown University	1300 - 1490
Baltimore	Johns Hopkins University	1290 - 1500
Rochester	University of Rochester	1290 - 1500
Cleveland	Case Western University	1200 - 1410
Minneapolis-St. Paul	University of Minnesota	1120 - 1380
Austin	University of Texas at Austin	1110 - 1360
Seattle	University of Washington at Seattle	1090 - 1320
Buffalo	University at Buffalo	1040 - 1260
Louisville	University of Louisville	990 - 1250
Denver	University of Colorado at Denver	980 - 1190

Data Source: The College Board

Geographic Reach of Enrollment: Attracting a geographically diverse base of students not only enriches the academic experience at the region's universities, but also sets the stage for a knowledge workforce in Buffalo metro with varied perspectives and backgrounds.

In this regard, Buffalo metro has room for growth. **The region has the fewest out-of-state freshmen college students than all but one peer region.** Five percent of the freshmen student base in this region hails from beyond New York State, with only Austin pulling in fewer out-of-state students **(Fig. 6).** Seattle and Louisville – similar to Buffalo metro and Austin in that their most prominent institutions are state universities – draw 14 percent of their students from beyond state borders.

Figure 6 – Buffalo Metro Out-of-State Enrollment at Bottom Compared to Peer Regions.

Metropolitan Area	% Out-of-State Freshmen, 2005
Washington, D.C.	50%
Baltimore	38%
Minneapolis-St. Paul	33%
Philadelphia	25%
Denver	19%
Raleigh-Durham	18%
Rochester	16%
Pittsburgh	16%
Seattle	14%
Louisville	14%
Cleveland	12%
Buffalo	5%
Austin	2%

Data Source: National Center for Education Statistics

Continuing Education: Enrollment of non-traditional and part-time students can be indicative of a regional economy that is re-training or growing its workforce to fill gaps in employment. On both measures, however, Buffalo metro falls below its peer regions.

Figure 7 –Buffalo Metro Non-Traditional Student Enrollment Low Relative to Peer Regions.

Metropolitan Area	% Students at two-year schools age 25+, 2005	% Students at four-year schools age 25+, 2005
Cleveland	48%	57%
Seattle	48%	41%
Denver	47%	43%
Raleigh-Durham	47%	33%
Louisville	46%	44%
Washington, D.C.	43%	51%
Baltimore	42%	43%
Pittsburgh	42%	31%
Philadelphia	41%	35%
Minneapolis-St. Paul	39%	48%
Austin	39%	26%
Buffalo	34%	29%
Rochester	33%	25%

Data Source: National Center for Education Statistics

The region's two-year institutions are second to last in attracting non-traditional students, or those aged 25 or older. The region's four-year institutions rank similarly low, although they surpass Austin and rival Pittsburgh in this enrollment category **(Fig. 7)**. The region's low adult enrollment is despite its relatively low-cost higher education and large percentage of adults without college degrees.

Figure 8 –Part-Time Student Enrollment Lowest in Buffalo Metro Relative to Peer Regions.

Metropolitan Area	% Part-time Students, 2006
Austin	49%
Washington, D.C.	49%
Seattle	45%
Minneapolis-St. Paul	44%
Louisville	42%
Baltimore	42%
Denver	40%
Cleveland	37%
Philadelphia	35%
Raleigh-Durham	28%
Pittsburgh	27%
Rochester	25%
Buffalo	21%

Data Source: National Center for Education Statistics

Pa rt-time attendance is another measure of continuing education of the region's workforce. Approximately two out of 10 college students in Buffalo metro attend school part-time, a lower concentration than any other peer region (Fig. 8). Noteworthy is that Buffalo metro, relative to peer regions, does not have a larger proportion of undergraduate students, which could contribute to a higher-than-average proportion of full-time enrollment.

Higher Education Rankings: Although not a regional indicator per se, the position of a region's institutions in national rankings directly affects Buffalo metro's ability to attract academically strong students.

According to multiple indices, Buffalo metro's academic institutions rank lower nationally relative to institutions in comparable regions, revealing significant room for improvement in the overall quality and national reputation of academic institutions within the region **(Fig. 9)**.

The region's largest public research institution, the University at Buffalo, ranks 118 in *U.S. News & World Report's* national standings for baccalaureate programs, with the University of Louisville the only peer-region institution ranked lower (131-187, unranked).[3] Both Buffalo and Louisville are the only peer regions without at least one school ranked in the top 100 nationally for undergraduate education. Buffalo, along with Louisville and Denver, lacks at least one professional school ranked in the nation's top-25 for law, business, medicine or engineering.

[3] *U.S. News & World Report* academic rankings consider seven indicators when assessing school performance: peer assessments (25%), retention rates (20%), faculty resources (20%), admissions selectivity (15%), financial resources (10%), graduation rate performance (5%), and the alumni giving rate (5%). Of these, peer assessments, retention rates, and faculty resources are weighed the highest. Peer assessments include the opinions of top higher education administrators and faculty on measures such as faculty dedication and the quality of academic programs.

Despite the absence of overall national rankings, Buffalo metro's strength in specific knowledge economy growth areas is noteworthy. For instance, three master's-level[4] colleges in the region – Canisius College, St. Bonaventure University and Niagara University – rank in the top-100 for master's level colleges in the northeast. *U.S. News & World Report* ranks the University at Buffalo 57th among engineering schools whose highest degree is a doctorate. The University at Buffalo Law School is ranked 100th in the nation. Additionally, the University at Buffalo has four nationally recognized medical specializations including audiology, speech and language pathology, clinical psychology and nursing, according to *U.S. News & World Report* rankings.

Figure 9 – National Higher Education Rankings, *U.S. News & World Report*

Region	Highest-Ranking Research University	Number & Name of Top 25 Law Schools	Number & Name of Top 25 Medical Schools	Number & Name of Top 25 Business Schools	Number & Name of Top 25 Engineering Schools (PhD)
Austin	University of Texas at Austin (44)	1 University of Texas at Austin (16)	0	1 University of Texas at Austin (18)	1 University of Texas at Austin (11)
Baltimore	Johns Hopkins University (14)	0	1 Johns Hopkins University (2)	0	0
Buffalo**	University at Buffalo (118)	0 University at Buffalo (100)	0 University at Buffalo (Overall Unranked) University at Buffalo - Audiology (16) University at Buffalo - Clinical Psychology (43) University at Buffalo - Nursing (72) University at Buffalo - Speech and Language Pathology (25)	0	0 University at Buffalo (57)
Cleveland	Case Western University (41)	0	1 Case Western University (23)	0	0
Denver	University of Colorado at Boulder (79)	0	0	0	0
Louisville	University of Louisville (unranked)	0	0	0	0
Minneapolis-St.Paul	University of Minnesota (71)	1 University of Minnesota at Twin Cities (22)	0	0	1 University of Minnesota at Twin Cities (24)
Philadelphia	University of Pennsylvania (5)	1 University of Pennsylvania (7)	1 University of Pennsylvania (4)	1 University of Pennsylvania (3)	0
Pittsburgh	Carnegie Mellon University (22)	0	1 University of Pittsburgh (14)	1 Carnegie Mellon University (17)	1 Carnegie Mellon University (7)
Raleigh-Durham	Duke University (8)	1 Duke University (12)	2 University of North Carolina at Chapel Hill (19)	2 University of North Carolina at Chapel Hill (19)	0
			Duke University (6)	Duke University (14)	0
Rochester	University of Rochester (35)	0	0	1 University of Rochester (25)	0
Seattle	University of Washington (42)	0	1 University of Washington (6)	0	1 University of Washington (24)
Washington, D.C.	Georgetown University (23)	2 Georgetown University (14) George Washington University (20)	0	1 Georgetown University (22)	1 University of Maryland at College Park (17)

Data Source: U.S. News and World Report

** At the graduate level, no schools in the Buffalo region rank nationally in any of the categories listed above. Rankings for Buffalo are supplied for informative purposes only.

[4] Master's-level colleges, as defined by U.S. News & World Report, offer a range of undergraduate and master's degree programs, but few doctoral programs.

According to a regional educational quality index, Buffalo falls behind all but one comparable region at both the undergraduate and graduate levels. The index, which was used in a 2000 study of the Greater Philadelphia's Knowledge Industry, awards points to institutions based on their graduate and undergraduate programs' position in the various *U.S. News & World Report* rankings **(Fig. 10).**

Figure 10 – National Education Quality Index (Greater Philadelphia Knowledge Industry)

Undergraduate Programs	Graduate Programs
Top 50 national undergraduate university – 8 points	Top 25 law school – 10 points
Top 51-100 national undergraduate university – 5 points	Top 25 medical school – 10 points
Top 101-150 national undergraduate university – 1 point	Top 25 business school – 10 points
Top 40 liberal arts college – 3 points	Top 25 Engineering Ph.D. program – 3 points
Top 50 regional undergraduate university – 1 point	Top 25 Chemistry Ph.D. program – 3 points
	Top 25 Physics Ph.D. program – 3 points
	Top 25 Biological Sciences program – 3 points
	Top 25 Computer Sciences Ph.D. – 3 points

Data Source: U.S. News and News Report

Buffalo metro earned a score of four according to this index. The score tallies one point each for the University at Buffalo's 118th national ranking, Canisius College's ranking at 22nd and St. Bonaventure University's placement at 38th among best master's-level universities in the northeast, and Hilbert College's spot in the best 33-45 baccalaureate colleges in the northeast **(Fig. 11).** The University at Buffalo, placed as a third-tier baccalaureate college, was the only Buffalo metro institution to rank nationally on the index. Hilbert College, Canisius College, St. Bonaventure University and Niagara University were ranked at the regional level.

Figure 11 – Buffalo Metro Scores Near Bottom on National Education Quality Index.

Metropolitan Area	Overall Score
Raleigh-Durham	84
Philadelphia	74
Pittsburgh	73
Washington, D.C.	67
Austin	46
Baltimore	39
Minneapolis-St. Paul	36
Seattle	33
Cleveland	25
Rochester	21
Denver	20
Buffalo	4
Louisville	2

Data Source: Point system applied to U.S. News and World Report rankings

b. EDUCATING for the knowledge economy

Attracting students to the region's higher education institutions is only the first step – these institutions must then follow through in providing a high-quality, enriching education that effectively prepares students for the knowledge economy. The following indicators assess how the region fares in higher education quality and knowledge workforce training.

Degrees granted in "new economy" fields: In the new economy, businesses thrive on constant innovation and a concentration of knowledge in their employees. Universities and colleges play a key role in preparing a workforce trained in niche areas of the new economy, including the life and physical sciences and engineering.

Overall, Buffalo metro lags leading knowledge regions in the percentage of degrees granted in the "new economy" fields of engineering, math, computers, biology, health and the physical sciences. Only one in four degrees is granted in one of these areas, compared to nearly one in three in Baltimore, Pittsburgh and Raleigh-Durham. A closer look reveals that Buffalo metro ranks fourth for health sciences degrees granted **(Fig. 12)**. However, the region is behind its peers in the areas of engineering, computers and the biological and physical sciences. A detailed summary of the degrees granted for each region is provided in **Appendix A.**

Figure 12 – Buffalo Metro Stacks Up Against Peer Regions in Health Degrees Awarded.

Metropolitan Area	% Total Degrees in Health, 2006
Louisville	15%
Baltimore	15%
Philadelphia	14%
Pittsburgh	13%
Buffalo	12%
Denver	11%
Cleveland	11%
Minneapolis-St.Paul	11%
Rochester	10%
Raleigh-Durham	10%
Seattle	9%
Washington, D.C.	7%
Austin	6%

Data Source: National Center for Education Statistics

Figure 13 – Universities in Buffalo Metro Spend Less on Research than Peer Region Institutions.

Metropolitan Area	University Research Spending per FTE Student, 2006
Baltimore	$17,185
Raleigh-Durham	$14,853
Pittsburgh	$12,497
Louisville	$10,349
Philadelphia	$7,737
Rochester	$6,028
Minneapolis-St. Paul	$5,561
Seattle	$5,154
Austin	$4,539
Buffalo	$4,319
Cleveland	$3,974
Denver	$3,943
Washington, D.C.	$3,413

Data Source: National Center for Education Statistics

Research spending: High levels of research spending by a region's higher education institutions suggest a vibrant, churning environment for innovation and knowledge generation. Moreover, how these funds are directed can be a strong indicator of a region's economic priorities.

With respect to its colleges' and universities' investment in research, Buffalo metro does not measure up to its peers. Per-student research spending in Buffalo metro, at $4,300, lags behind every peer region but Cleveland, Denver and Washington DC, and is nearly four times behind Baltimore, the top region for research spending **(Fig. 13)**. Also,

Buffalo metro has fewer academic institutions engaged in research and development in the fields of science and engineering than many of its peers. Among the academic institutions examined in this report, only three institutions – Buffalo State College, Canisius College and the University at Buffalo – had research and development expenditures in science and engineering, placing the region behind all peer regions but Austin, Louisville and Seattle (see **Appendix B**).

Buffalo metro allocates its research dollars similarly to its peers, including regions with higher-ranked institutions (Raleigh-Durham, Minneapolis and Cleveland). All four regions focus mainly on the life sciences, including the health and biological sciences, dedicating over 70 percent of research funds to these fields. Life sciences research investment in Buffalo metro is critical given the concentration of health facilities and hospitals within the region. Engineering is Buffalo metro's second largest category of total research and development expenditures, accounting for 16 percent of the total. A complete list of research spending by region, with university-specific data, is provided in **Appendix B.**

As a research funding source, federal dollars represent new dollars, thereby allowing institutional funds to be invested into other areas such as educational programming. Higher education institutions in Buffalo metro are not as successful as those in peer regions in securing federal research dollars. The region's institutions obtain about half of their research funding from the federal government, significantly less than many peer regions including Seattle (84 percent) and Austin (63 percent) (where the main universities are also public institutions) **(Fig. 14).** Institutional funds, and to a lesser extent, funding from industry, state/local government and other sources, fill the gap in Buffalo metro left by the relatively small portion of federal research funding.

Figure 14 – Buffalo Metro Institutions Receive Fewer Federal Research Dollars Compared to Those in Peer Regions.

Metropolitan Area	% Total Research Funding Supported by Federal Government, 2006
Denver	86%
Seattle	84%
Cleveland	78%
Rochester	75%
Baltimore/Washington, D.C.	75%
Pittsburgh	70%
Austin	63%
Philadelphia	62%
Raleigh-Durham	61%
Minneapolis-St. Paul	55%
Buffalo	52%
Louisville	49%

Data Source: National Science Foundation, Division of Science Resources Statistics.

Nationally-Recognized Faculty: The ability of an institution's faculty to earn national recognition is an important indicator of academic quality.

Relative to its peers, Buffalo metro is near the bottom for faculty distinctions, as measured by the number of faculty earning national-level awards or membership in the National Academy of Science, which recognizes achievements in original research. In Buffalo metro, just 3 per 1,000 faculty earn such distinctions, compared to more than 10 per 1,000 in Austin, Raleigh-Durham, Seattle and Baltimore **(Fig. 15).** A comprehensive list of peer region colleges and universities with national faculty recognition is provided in **Appendix C.**

Figure 15 – Buffalo Metro Ranks Below Peers for National-Level Faculty Recognition.

Metropolitan Area	National Academy of Science Members, 2005	Faculty Awards, 2005	Faculty Recognitions Per 1,000 FTE Faculty, 2005
Austin	56	28	16
Raleigh-Durham	89	70	16
Baltimore	81	77	13
Seattle	85	29	11
Pittsburgh	52	44	9
Rochester	27	15	8
Philadelphia	103	46	7
Minneapolis-St.Paul	36	32	6
Cleveland	21	26	6
Washington	45	47	5
Denver	40	20	5
Buffalo	5	10	3
Louisville	1	7	2

Data Source: Center for Measuring University Performance and National Center for Education Statistics

Fostering the Creative Class: A region's economic potential is further defined by the ability of its academic institutions to capitalize on research findings with patents for invention, which leverage significant economic gains and national repute. Patent generation in the private sector reflects the strength of knowledge transfer from academia to businesses, which contributes to the richness of the education experience as well as the resilience of a region's knowledge economy.

In academic patent generation, Buffalo metro outperformed many of its peers, including Austin, Denver and Rochester, and was on par with Washington DC **(Fig. 16).** Comparing university patent generation to the region's overall patent generation is also a measure of a higher education sector's innovative role in a region. In this regard, Buffalo metro is competitive with its peers. The University at Buffalo earned 7.4 percent of all patents in Buffalo metro in 1999, a proportion lower than only Baltimore, Raleigh-Durham and Pittsburgh. Notably, the number of patents granted to University at Buffalo doubled from 1995 to 1999.

Figure 16 – Buffalo Metro Outperforms Many of its Peers in University Patent Generation.

Metropolitan Area	Total University Patents Granted, 1999	Total Contributing Universities, 1999	University Patents as % of Total in Region, 1999
Baltimore	108	3	21%
Raleigh-Durham	94	4	12%
Philadelphia	89	4	6%
Pittsburgh	71	3	11%
Seattle	47	2	4%
Minneapolis-St. Paul	44	1	3%
Cleveland	25	1	4%
Washington, D.C.	20	5	2%
Buffalo	20	1	7%
Austin	17	1	1%
Denver	9	4	2%
Rochester	6	1	0%
Louisville	--	0	0%

Data Source: U.S. Patent and Trademark Office

However, companies in Buffalo metro struggle to innovate or capitalize on university innovations. In 1999, businesses within Buffalo metro issued only 190 patents overall, falling behind all other regions but Louisville **(Fig. 17)**. In contrast, Rochester generated 1,423 patents, the second highest of all peer regions. The distribution of patenting activity across organizations – rather than concentration in a few – can be indicative of a more diverse environment of innovation. In this regard, Buffalo metro outperforms its neighbor to the east. The top-two patenting organizations in Rochester earned 86 percent of all patents compared to 23 percent in Buffalo metro.

Figure 17 – Buffalo Metro Falls Behind in Private Sector Patent Generation, but Patent Activity is More Dispersed.

Metropolitan Area	Top 2 Contributing Businesses (Name & # Patents), 1999	# Business Patents Total, 1999	% Total Patents, 1999
Rochester	EASTMAN KODAK COMPANY (843) XEROX CORPORATION (421)	1423	86%
Austin	INTERNATIONAL BUSINESS MACHINES CORPORATION (428) ADVANCED MICRO DEVICES, INC. (422)	1343	59%
Raleigh-Durham	ERICSSON, INC. (177) INTERNATIONAL BUSINESS MACHINES CORPORATION (169)	621	44%
Seattle	MICROSOFT CORPORATION (317) BOEING COMPANY (111)	877	40%
Washington, D.C.	UNITED STATES OF AMERICA, NAVY (144) UNITED STATES OF AMERICA, HEALTH & HUMAN SERVICES (120)	671	26%
Buffalo	PRAXAIR TECHNOLOGY, INC. (44) MOORE BUSINESS FORMS INC. (19)	190	23%
Baltimore	BLACK & DECKER INC. (35) NORTHROP GRUMMAN CORPORATION (27)	242	12%
Minneapolis-St.Paul	MINNESOTA MINING AND MANUFACTURING COMPANY (256) 3M INNOVATIVE PROPERTIES COMPANY (143)	1488	23%
Pittsburgh	EATON CORPORATION (57) PPG INDUSTRIES OHIO INC. (54)	420	18%
Philadelphia	SMITHKLINE BEECHAM CORPORATION (166) MERCK + CO., INC. (81)	981	17%
Louisville	GENERAL ELECTRIC COMPANY (12) AAF INTERNATIONAL INC. (5)	49	17%
Denver	LUCENT TECHNOLOGIES INC. (23) COBE LABORATORIES, INC. (16)	198	11%
Cleveland	LUBRIZOL CORPORATION (28) GENERAL ELECTRIC COMPANY (24)	381	9%

c. RETAINING graduates for the regional workforce

Investments to attract greater numbers of students and to improve education quality fall short – and the region's fledgling new economy is stymied – when the region's higher education graduates must leave the region to find employment. The following data and analysis are illuminative of the region's ability to retain its higher education graduates.

"Retaining Brains": The region's success in transitioning its higher education graduates into the Buffalo metro economy can be assessed by comparing the number of college students or young graduates to the region's population of college-educated adults at key career ages. Specifically, this analysis compares the number of 18- to 24-year-olds currently in school or with a degree to the number of degreed adults age 25-34.

With respect to this ratio (low ratio represents better rate of graduate retention), Buffalo metro surpasses Denver and Austin and is in good company with Seattle, Philadelphia, Minneapolis-St. Paul, Baltimore and Raleigh-Durham. Buffalo metro institutions may have an advantage in their high enrollment of regional natives **(Fig. 18)**. A key issue that would require further analysis is whether Buffalo metro graduates remaining in the area find employment within their disciplines.

Quality-of-Life Factors: Members of the knowledge workforce, dubbed the "creative class," are drawn to communities that have both a vibrant economy and a sense of place – culture and recreation, diversity, and affordable and unique housing.[5] Buffalo metro features many quality-of-life draws, including affordable housing, short commutes and diverse cultural amenities. The region, however, has room for growth in the areas of population diversity and the strength of its urban core.

Cost of living/Home prices: **The average cost of a single family home in Buffalo metro is lower than in all peer knowledge regions**, including two of Buffalo metro's closet peers. The average cost of housing in Louisville and Rochester exceeds Buffalo metro's by more than $10,000 **(Fig. 19).**

Figure 18 – Buffalo Metro Competitive with Peers in Retaining Brains.

Metropolitan Area	Brain drain from region (18-24 in school or with degree/25-34 with degree), 2000
Cleveland	1.0
Washington, D.C.	1.1
Louisville	1.1
Rochester	1.1
Pittsburgh	1.1
Seattle	1.2
Philadelphia	1.2
Buffalo	1.2
Minneapolis-St. Paul	1.2
Baltimore	1.2
Raleigh-Durham	1.2
Denver	1.3
Austin	1.3

Data Source: U.S. Census Bureau

Figure 19 – Buffalo Metro Housing Costs are Low Compared to Peers.

Metropolitan Area	Average cost of single-family home (in thousands), 2006
Washington, D.C.	$431
Seattle	$387
Baltimore	$286
Denver	$245
Philadelphia	$235
Minneapolis-St. Paul	$225
Raleigh-Durham	$224
Austin	$184
Louisville	$137
Cleveland	$130
Pittsburgh	$121
Rochester	$118
Buffalo	$104

Data Source: National Associate of Realtors

[5] In *The Rise of the Creative Class*, author Richard Florida describes how creative types – artists, engineers and scientists – and a community's ability to attract a critical mass of these individuals, are fundamental to success in today's new economy. Florida, R.A. (2002). *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life*. New York: Basic Books.

Commute times: **Employees in the Buffalo metro region spend less time on their daily commute to work.** Buffalo metro's average one-way commute is 10 minutes shorter than Baltimore's and Philadelphia's **(Fig. 20).** Likely reflecting the smaller size of the Buffalo metro region as well as less congestion, the region's relatively short commute is also indicative of greater accessibility to services and amenities. Buffalo metro's shorter commute translates into an extra seven hours of personal time each month for commuters when compared to Baltimore and Philadelphia.

Figure 20 – Commute Time Shortest in Buffalo Metro.

Metropolitan Area	Average minute commute time to work, 2003
Baltimore	29
Philadelphia	29
Washington, D.C.	28
Cleveland	25
Seattle	25
Denver	23
Austin	22
Pittsburgh	21
Raleigh-Durham	21
Minneapolis-St. Paul	20
Buffalo	19
Louisville	19
Rochester	not available

Data Source: 2003 American Community Survey

Declining urban core: In many regions, the urban core is the hub in the exchange of knowledge, ideas and culture. **While Raleigh-Durham increased its central city population by one-quarter between 2000 and 2006, Buffalo lost 6 percent of its population (Fig. 21)**. The steadily declining population in Buffalo and the accompanying economic strain likely play a significant role in the lack of entrepreneurial activity and the region's difficulty in attracting newcomers. At the same time, college students constitute 4 percent of Buffalo's population, a denser concentration of urban students than five peer regions (Baltimore, Cleveland, Denver, Louisville and Philadelphia) and indicative of a rich base of ideas and talent in the region's urban core.

Figure 21 – Buffalo Metro's Urban Core Saw Population Decline, while Other Regions Saw Strong Growth.

Metropolitan Area	Central city population change, 2000-06
Raleigh-Durham	25%
Austin	8%
Seattle	3%
Denver	2%
Washington, D.C.	2%
Louisville	1%
Minneapolis-St. Paul	-3%
Baltimore	-3%
Philadelphia	-5%
Rochester	-5%
Buffalo	-6%
Pittsburgh	-6%
Cleveland	-7%

Data Source: U.S. Census Bureau

Population diversity: Population diversity contributes to an exchange of culture and ideas, critical drivers of the knowledge-based economy. Buffalo metro is poised for growth in this indicator. The region is located at the doorstep of an international border and several of the region's colleges and universities have strong and growing international student enrollment.

Yet the region is relatively homogenous when compared to peer regions. The region's minority population is one of the lowest of all peer regions, while the proportion of foreign-born is nearly three times smaller than that of Austin, Denver and Seattle **(Fig. 22).** This suggests Buffalo metro needs to do more to retain diverse populations and to attract newcomers such as minority and immigrant communities.

Figure 22 – Buffalo Metro's Population is Less Diverse Compared to Peer Regions.

Metropolitan Area	% Minority population, 2000	% Foreign born population, 2000
Washington, D.C.	44%	17%
Austin	39%	12%
Baltimore	34%	6%
Raleigh-Durham	33%	9%
Philadelphia	30%	7%
Denver	28%	11%
Seattle	23%	12%
Cleveland	22%	5%
Louisville	18%	3%
Rochester	18%	6%
Buffalo	17%	4%
Minneapolis-St. Paul	15%	7%
Pittsburgh	11%	3%

Data Source: U.S. Census Bureau

Economic Indicators: Although the region has progressed in its transition from a manufacturing- to knowledge-based economy, the following data suggest the region needs to make major strides in strengthening its position in the new economy if it is to successfully retain its college graduates.

Figure 23 – Professional and Technical Employment Opportunities are Less Plentiful in Buffalo Metro Relative to Peer Regions.

Metropolitan Area	% Professional & Technical Employment, 2006	% Information / Finance / Insurance Employment, 2006
Washington, D.C.	15%	7%
Denver	10%	10%
Austin	9%	8%
Baltimore	9%	6%
Raleigh-Durham	9%	6%
Philadelphia	8%	8%
Minneapolis-St. Paul	7%	8%
Pittsburgh	7%	7%
Seattle	7%	8%
Buffalo	6%	7%
Cleveland	6%	7%
Rochester	6%	6%
Louisville	5%	7%

Data Source: U.S. Bureau of Economic Analysis

Professional and technical jobs: **There are fewer professional and technical employment opportunities for college graduates in Buffalo metro than in peer regions.** One in 16 jobs in Buffalo metro is professional or technical, compared to nearly one in seven in Washington DC and one in 10 in Denver, Austin, Baltimore and Raleigh-Durham **(Fig. 23).** A closer look at specific professional fields shows Buffalo metro faring somewhat better – jobs in information/finance/insurance are as equally plentiful in Buffalo metro as they are in Washington DC, Pittsburgh and Cleveland. These data suggest students educated in new economy fields at the region's colleges and universities might be forced to look elsewhere to start their careers.

Figure 24 – Average Wages in Buffalo Metro Fall Below Most Peer Regions, even after Cost-of-Living Adjustments.

Metropolitan Area	Average Wage per Job, 2006	Adjusted Average Wage per Job, 2006
Washington, D.C.	$57,696	$43,196
Seattle	$48,305	$44,088
Philadelphia	$47,228	$39,874
Denver	$47,127	$48,550
Baltimore	$45,980	$40,508
Austin	$45,341	$49,814
Minneapolis-St. Paul	$45,180	$47,454
Raleigh-Durham	$42,910	$47,119
Pittsburgh	$40,101	$44,172
Cleveland	$39,832	$42,257
Rochester	$38,656	$40,250
Louisville	$37,722	$40,854
Buffalo	$36,594	$36,594

Data Source: U.S. Bureau of Economic Analysis and CNN Money Cost-of Living Calculator.

Adjusted average wages: **In terms of earning power, Buffalo metro is at the bottom of the list when compared to peer regions.** Even after adjusting for the region's relatively low cost of living, Buffalo metro average wages per job are only $36,594, about 30 percent below average wages in the top-earning regions of Austin, Denver and Raleigh-Durham **(Fig 24).**

Opportunities for entrepreneurship: The degree to which a region supports entrepreneurial activity is increasingly indicative of resilience in the new economy. **As measured by self-employment, Western New York falls behind all peer regions**. Self-employment accounts for 14 percent of all jobs in Western New York compared to as much as 21 percent in Austin and Denver **(Fig. 25).** The region also lags Rochester, a region subject to the same state laws and regulations that have been said to challenge higher levels of entrepreneurialism and self-employment within Western New York.

Figure 25 – Proportion of Self-Employment in Buffalo Metro Below all Peer Regions.

Metropolitan Area	% Self-Employment, 2006
Austin	21%
Denver	21%
Seattle	18%
Raleigh-Durham	17%
Rochester	17%
Baltimore	16%
Minneapolis-St. Paul	16%
Pittsburgh	16%
Washington, D.C.	16%
Cleveland	15%
Louisville	15%
Philadelphia	15%
Buffalo	14%

Data Source: U.S. Bureau of Economic Analysis

National ranking as a place for business and careers: College graduates researching areas to establish a career might be swayed from considering Western New York, at least according to one national ranking. **Forbes's 2008 ranking of *Best Places to Live for Business and Careers* places Western New York last compared to other knowledge areas,** and 164th out of the largest 200 metro areas in the U.S. **(Fig. 26).** In fact, the majority of comparison regions, including Rochester, fall within the list's top 100**.**

Figure 26 – Forbes Ranks Buffalo Metro at Bottom Relative to Peers as a Place for Business and Careers.

Metropolitan Area	Rank on Forbes list of best places for business and careers, 2008
Raleigh-Durham	1
Seattle	20
Washington, D.C.	25
Denver	31
Austin	47
Rochester	52
Baltimore	71
Pittsburgh	83
Louisville	91
Minneapolis-St. Paul	103
Philadelphia	132
Cleveland	149
Buffalo	164

Data Source: Forbes.com

V. Recommendations

Based on the data and analysis provided in this report, the following recommendations are offered to help the region progress in 1) attracting a larger and increasingly talented core of university-level students, 2) providing quality higher education that is aligned with the evolving new economy, and 3) retaining graduates in the Buffalo metro region.

ATTRACTING diverse, high-performing students

The key draws of higher education in Buffalo metro are the concentration of students, the region's college-town environment and high quality of life. At the same time, the region falls behind peer regions in terms of education quality and the academic caliber and diversity of its students.

- **In the short-term, expand enrollment across all sectors by jointly marketing the competitive advantages of higher education in the Buffalo metro region and across New York State, including key strengths in academic programs and regional quality of life**.
    - **As the region's institutions improve in academic rankings, target marketing efforts to expand out-of-state student enrollment.** Data show there is room for growth in these areas, with the added benefit of diversifying the region's student body and the prospective knowledge workforce. Marketing efforts could focus on quality programs, affordability and Buffalo metro's quality-of-life appeal for out-of-state students.
    - **Partner with regional employers to advance enrollment of and programming for continuing education.** In an age where the economy is being driven by rapid innovations, it is imperative to focus on maintaining and updating workforce skills regularly.

- **Over the long-run, advance the region in national and regional rankings to attract students with stronger academic profiles.** Increased academic competitiveness is key to enhancing the region's ability to increase, diversify and improve the caliber of the region' student core.
    - **Explore cross-institutional collaborations,** such as investing in enhanced resources for faculty, to advance the region's position in rankings.
    - **Attract and retain more renowned faculty to distinguish Buffalo metro's regional institutions at the national level and help to improve overall rankings.** This is particularly relevant in that two key indicators in the *U.S. News & World Report's* higher education rankings are faculty resources and peer assessments (opinions of top academic institutions representatives on factors such as faculty dedication and academic program quality).
    - **Leverage increased enrollment for more selective admissions** to further strengthen the academic standing of the region's college students.

EDUCATING for the knowledge economy

Buffalo metro higher education trails peer knowledge regions in the conferral of degrees in "new economy" fields, research spending and national recognition of its faculty. Yet the region performs relatively well in terms of educating students in the health sciences and in university patent generation.

- **Leverage the life sciences.** The life sciences fields, including health and biological sciences, have the potential to anchor Buffalo metro in the new economy. While already recognized for its academic programs in health sciences specializations, the region is producing health science graduates and investing in health and biological research at a rate on par with its peers. Buffalo metro also has a vibrant mix of health, medical and biomedical service and research employers, with economic development efforts focused on growing this sector even more. The region's higher education institutions should continue to focus on increased enrollment and enhanced quality in its life sciences programs.

- **Diversify investment in other new economy fields.** In the long-term, the region should diversify its position in the new economy by expanding investments in the fields of engineering, the physical sciences, and arts programs and new media**.** Efforts could include attracting and retaining distinguished faculty and securing research grants in these fields.

- **Continue to facilitate the transfer of university-based innovation to the corporate sector** to connect university-based knowledge to the larger economy. Both universities and the region's private sector should find new ways to transfer innovation both to enrich the region's education experience and strengthen an entrepreneurial economy in Buffalo metro.

RETAINING graduates for the regional workforce

Buffalo metro's low cost of living provides a strong incentive for new graduates to remain in the area following graduation. According to a comparison of college students and recent graduates to professional adults with degrees, Buffalo metro is more successful than its peers in "retaining its brains." The region also offers many advantages to new graduates, particularly family-oriented young professionals in search of affordable housing and a high quality of life. Yet questions remain as to whether the region is holding onto graduates that are not native to Buffalo metro. Additionally, limited professional and technical employment opportunities and relatively low earnings may push the region's graduates to areas offering greater potential for career growth.

- **Promote region's affordability and high quality of life.** The region can immediately capitalize on its low cost of living and livability to encourage graduates to remain in the area. Although adjusted average wages in the region are low compared to competitor regions, the region offers culture, recreation and other quality-of-life amenities rivaling some of the nation's top places to live.

- **Tap potential of Buffalo metro natives' loyalty to region.** This cohort has strong ties to the area and is therefore the most likely to remain in the area following graduation. Encouraging these students to enroll in new economy fields could help the region expand its capacity in the knowledge-based economy and even attract new employers in search of these graduates.

- **Target students from outside region in retention efforts.** Long-term focus also needs to be placed on retaining students from outside the area, not only to spur new economy growth, but to build diversity. In marketing Buffalo metro to non-native graduates, emphasis should be placed on the region's employment opportunities in new economy niche areas, such as the health sciences and banking and finance, as well as the region's affordability and receptive environment for the "creative class."

- **Enhance entrepreneurial opportunities.** To diversify and increase the resilience of the region's knowledge-based economy, and thus the attractiveness of the region as a place to live and work, economic development efforts should focus on improving entrepreneurial activity. Universities and colleges in the region may find a role in facilitating the transfer of research and patenting activity to the private sector and individuals, and in assisting economic development entities to strategically direct investment efforts.

VI. Appendices

Appendix A: Summary of Degrees Granted in New Economy Fields

New economy fields include health, engineering, computers, biology/physical sciences and math/statistics. The table shows total degrees granted in new economy fields as a percentage of total degrees granted in the region. Data reflect 2005-06 and are from the National Center for Education Statistics Integrated Postsecondary Education Data System (http://nces.ed.gov/ipedspas/).

				----------New Economy Fields----------				
Metropolitan Area	Total Degrees in All Academic Fields, 2006	Total Degrees in "New Economy" Fields, 2006	% Total Degrees in "New Economy" Fields, 2006	% Degrees in Health, 2006	% Degrees in Engineering, 2006	% Degrees in Computers, 2006	% Degrees in Biological/ Physical Science, 2006	% Degrees in Math and Statistics, 2006
Baltimore	27,232	8,826	32%	15%	5%	6%	5%	1%
Pittsburgh	29,364	9,326	32%	13%	8%	6%	4%	1%
Raleigh-Durham	22,577	6,969	31%	10%	9%	3%	8%	1%
Louisville	9,794	2,704	28%	15%	6%	3%	3%	0%
Rochester	16,656	4,496	27%	10%	6%	3%	6%	1%
Denver	32,740	8,665	26%	11%	6%	4%	4%	1%
Cleveland	24,306	6,324	26%	11%	7%	3%	4%	1%
Philadelphia	68,022	17,209	25%	14%	4%	3%	4%	1%
Austin	22,770	5,561	24%	6%	8%	3%	6%	1%
Buffalo	18,279	4,425	24%	12%	5%	3%	3%	1%
Washington	59,029	13,721	23%	7%	4%	7%	4%	1%
Minneapolis-St. Paul	43,730	9,947	23%	11%	4%	3%	4%	1%
Seattle	36,245	8,006	22%	9%	4%	3%	5%	1%

Data Source: National Center for Education Statistics

Appendix B: Research and Development Expenditures

Research and development expenditures in the fields of science and engineering are provided by region and institutions of higher education. Total dollar expenditures are provided, in addition to expenditures by source (federal, state, industry, institution, other) and research field (environmental science, life science, math/computers, physical science, psychology, social science, and engineering). Data reflect 2006 spending and are from the National Science Foundation, *Academic Research and Development Expenditures, Fiscal Year 2006, N*ovember 2007 (http://www.nsf.gov/statistics/nsf08300/).

Metropolitan area & university	All R&D expenditures, 2006 ($ in '000)	$ in Environmental sciences (in '000)	$ in Life sciences (in '000)	$ in Math and computer sciences (in '000)	$ in Physical sciences (in '000)	$ in Psychology (in '000)	$ in Social sciences (in '000)	$ in Sciences, nec (in '000)	$ in Engineering (in '000)
Austin									
Public									
TX State U. San Marcos	7,034	2,603	1,517	472	1,915	6	140	297	84
U. TX Austin	431,398	37,600	48,983	63,612	85,380	9,093	27,880	6,756	152,094
Total	438,432	40,203	50,500	64,084	87,295	9,099	28,020	7,053	152,178
Buffalo									
Public									
SUNY Buffalo all campuses	297,909	1,774	212,496	11,449	14,339	6,291	3,374	353	47,833
SUNY C. Buffalo	1,699	209	364	0	53	210	863	0	0
Private									
Canisius C.	434	0	343	36	55	0	0	0	0
Total	300,042	1,983	213,203	11,485	14,447	6,501	4,237	353	47,833
Cleveland									
Public									
Cleveland State U.	14,496	316	3,363	56	818	48	5,623	0	4,272
Kent State U. all campuses[b]	11,076	352	3,076	393	5,124	1,548	583	0	0
Northeastern OH Universities	5,294	0	5,294	0	0	0	0	0	0
U. Akron all campuses	28,440	195	2,247	609	11,987	73	4,810	0	8,519
Private									
Case Western Reserve U.	369,264	685	312,695	1,953	8,872	870	1,976	1,891	40,322
John Carroll U.	474	0	118	340	16	0	0	0	0
Oberlin C.	810	294	64	0	315	49	88	0	0
Total	429,854	1,842	326,857	3,351	27,132	2,588	13,080	1,891	53,113
Denver									
Public									
CO School of Mines	28,729	1,759	0	166	5,834	0	25	5,906	15,039
U. CO Boulder	250,255	90,614	32,299	8,391	62,026	13,388	7,353	1,434	34,750
U. CO at Denver and Health S	258,030	183	255,329	702	280	157	794	0	585
U. Northern CO	2,566	224	790	78	802	12	197	463	0
Private									
U. Denver	10,581	12	2,788	56	2,895	2,124	190	0	2,516
Total	550,161	92,792	291,206	9,393	71,837	15,681	8,559	7,803	52,890
Louisville									
Public									
U. Louisville	135,873	583	108,833	919	3,342	4,348	1,298	530	16,020
IN U. all campuses[c]	355,004	4,671	227,786	15,887	46,233	15,732	31,397	8,427	4,871
Total	490,877	5,254	336,619	16,806	49,575	20,080	32,695	8,957	20,891
Minneapolis									
Public									
St. Cloud State U.	2,224	28	829	34	159	5	1,024	0	145
U. MN all campuses[d]	594,877	14,474	434,861	23,961	28,001	13,165	25,285	0	55,130
U. WI River Falls	434	5	115	0	259	0	55	0	0
Private									
Augsburg C.	579	417	0	77	79	0	0	0	6
Carleton C.	1,785	884	223	140	499	39	0	0	0
Macalester C.	2,351	372	434	174	617	223	531	0	0
Northwestern Health Science	820	0	820	0	0	0	0	0	0
St. Olaf C.	854	0	639	0	215	0	0	0	0
U. of St. Thomas (St. Paul, MI	368	0	111	94	136	2	1	0	24
Total	604,292	16,180	438,032	24,480	29,965	13,434	26,896	0	55,305
Philadelphia									
Public									
Cheyney U. PA	278	0	278	0	0	0	0	0	0
Lincoln U. (Lincoln University	606	0	158	0	448	0	0	0	0
PA State U. all campuses[e]	644,182	52,793	200,986	42,942	64,166	22,776	24,533	372	235,614
Rowan U.	4,581	0	152	1,455	266	984	110	0	1,614
Rutgers, The State U. NJ all ca	308,204	28,649	154,884	19,203	39,420	12,717	26,160	1,926	25,245
Temple U.	79,736	198	56,304	923	5,570	10,992	2,797	0	2,952
U. DE	114,985	12,532	28,596	2,941	14,558	3,729	6,567	6,489	39,573
West Chester U. PA	244	0	141	0	100	0	3	0	0

Appendix B: Research and Development Expenditures (cont'd)

Metropolitan area & university	All R&D Expenditures, 2006 ($ in '000)	$ in environmental sciences (in '000)	$ in life sciences (in '000)	$ in math and computer sciences (in '000)	$ in physical sciences (in '000)	$ in psychology (in '000)	$ in social sciences (in '000)	$ in sciences, nec (in "000)	$ in engineering (in '000)
Philadelphia (cont.)									
Private									
Arcadia U.	334	9	233	16	28	5	5	2	36
Bryn Mawr C.	4,254	529	625	377	1,115	597	1,011	0	0
Drexel U.	96,687	0	48,341	7,149	3,150	1,314	0	0	36,733
Haverford C.	967	0	397	25	468	56	21	0	0
La Salle U.	243	0	143	3	4	43	50	0	0
PA C. of Optometry	1,642	0	1,642	0	0	0	0	0	0
Philadelphia C. of Osteopathi	1,034	0	1,015	0	0	19	0	0	0
Philadelphia U.	858	0	0	0	0	0	0	858	0
St. Joseph's U.	3,037	0	545	562	72	272	404	1,182	0
Swarthmore C.	2,385	0	682	37	665	385	186	165	265
Thomas Jefferson U.	106,986	0	106,986	0	0	0	0	0	0
U. PA	676,052	760	546,624	10,808	33,236	6,267	30,809	14,769	32,779
U. of the Sciences Philadelph	1,260	0	1,260	0	0	0	0	0	0
Ursinus C.	562	3	309	0	243	5	2	0	0
Villanova U.	7,122	164	548	428	703	144	76	0	5,059
Total	2,056,239	95,637	1,150,849	86,869	164,212	60,305	92,734	25,763	379,870
Pittsburgh									
Public									
PA State U. all campuses	644,182	52,793	200,986	42,942	64,166	22,776	24,533	372	235,614
U. Pittsburgh all campuses[g]	530,162	1,136	458,627	6,983	19,109	7,775	3,999	11,279	21,254
Private									
Carnegie Mellon U.	212,506	929	5,767	120,498	12,034	5,454	8,656	2,344	56,824
Duquesne U.	8,345	0	5,327	351	2,522	0	145	0	0
Total	1,395,195	54,858	670,707	170,774	97,831	36,005	37,333	13,995	313,692
Raleigh									
Public									
NC Central U.	6,597	795	3,772	471	612	947	0	0	0
NC State U.	330,936	13,223	162,953	17,005	22,189	11	10,406	9,083	96,066
U. NC Chapel Hill	443,790	22,258	349,179	14,040	26,032	5,581	26,700	0	0
Private									
Duke U.	657,080	13,530	553,834	10,614	17,594	3,004	23,312	0	35,192
Shaw U.	1,815	318	1,357	140	0	0	0	0	0
Total	1,440,218	50,124	1,071,095	42,270	66,427	9,543	60,418	9,083	131,258
Rochester									
Public									
SUNY C. Brockport	839	124	487	0	210	0	0	18	0
SUNY C. Geneseo	1,036	27	111	314	500	68	15	1	0
Private									
Rochester Institute of Techn	22,107	1,250	1,962	382	8,469	69	602	0	9,373
U. Rochester	366,658	914	234,547	2,936	12,137	14,556	459	1,308	99,801
Total	390,640	2,315	237,107	3,632	21,316	14,693	1,076	1,327	109,174
Seattle									
Public									
U. WA	778,148	92,110	541,524	6,850	33,803	10,936	17,564	0	75,361
Private									
Seattle U.	800	27	60	0	366	0	0	0	347
U. Puget Sound	431	64	61	2	9	1	192	102	0
Total	779,379	92,201	541,645	6,852	34,178	10,937	17,756	102	75,708
Washington/Baltimore									
Public									
Bowie State U.	1,951	0	124	1,827	0	0	0	0	0
George Mason U.	50,381	12,601	8,869	11,924	690	3,410	7,122	0	5,765
Morgan State U.	13,523	0	2,296	2,363	929	0	715	0	7,220
St. Mary's C. MD	417	0	203	3	25	179	7	0	0
Towson U.	1,038	0	226	306	394	10	102	0	0
U. Baltimore	7,856	0	0	0	0	0	7,856	0	0
U. DC	5,065	243	2,107	32	462	0	1,012	265	944
U. MD Baltimore	405,260	0	405,260	0	0	0	0	0	0
U. MD Baltimore County	65,718	22,118	10,110	2,956	5,599	2,177	6,226	6,172	10,360
U. MD College Park	354,244	13,893	60,333	43,461	60,990	4,310	82,936	0	88,321
U.S. Naval Academy	6,850	90	0	864	1,359	0	275	0	4,262
Uniformed Services U. of the	67,716	0	63,175	0	0	4,541	0	0	0
Private									
American U.	2,410	0	76	58	785	309	1,182	0	0
Catholic U. America, The	17,662	0	1,502	0	14,026	492	179	7	1,456
Gallaudet U.	2,013	0	467	0	0	1,476	54	16	0
George Washington U.	113,982	117	44,856	41,325	4,094	1,820	11,842	23	9,905
Georgetown U.	118,558	0	105,029	157	3,278	1,386	8,708	0	0
Howard U.	36,465	0	25,284	173	2,809	120	898	2,380	4,801
Johns Hopkins U., The[h]	1,499,977	40,256	702,207	97,431	140,183	7,674	5,051	39,945	467,230
Loyola C.	1,784	0	722	703	178	0	181	0	0
Total	2,772,870	89,318	1,432,846	203,583	235,801	27,904	134,346	48,808	600,264

Data Source: National Science Foundation

Appendix B: Research and Development Expenditures (cont'd)

Metropolitan area & university	All R&D expenditures, 2006 ($ in '000)	$ from Federal government, 2006 (in '000)	$ from State and local government (in '000)	$ from Industry (in '000)	$ from Institutional funds (in '000)	$ from All other sources ('in 000)
Austin						
Public						
TX State U. San Marcos	7,034	1,872	2,359	1,266	1,537	0
U. TX Austin	431,398	273,147	24,087	32,637	78,412	23,115
Total	438,432	275,019	26,446	33,903	79,949	23,115
Buffalo						
Public						
SUNY Buffalo all campuses	297,909	153,152	12,197	18,408	81,740	32,412
SUNY College at Buffalo	1,699	1,150	13	414	117	5
Private						
Canisius C.	434	159	0	275	0	0
Total	300,042	154,461	12,210	19,097	81,857	32,417
Cleveland						
Public						
Cleveland State U.	14,496	5,159	3,205	231	4,599	1,302
Kent State U. all campuses[b]	11,076	8,198	735	700	1,443	0
Northeastern OH Universities C	5,294	2,754	133	114	1,859	434
U. Akron all campuses	28,440	11,433	724	3,316	9,413	3,554
Private						
Case Western Reserve U.	369,264	306,980	16,148	6,277	19,050	20,809
John Carroll U.	474	452	0	22	0	0
Oberlin C.	810	548	0	128	134	0
Total	429,854	335,524	20,945	10,788	36,498	26,099
Denver						
Public						
CO School of Mines	28,729	20,543	484	7,702	0	0
U. CO Boulder	250,255	223,666	405	4,696	16,488	5,000
U. CO at Denver and Health Sci	258,030	221,214	1,648	6,572	11,934	16,662
U. Northern CO	2,566	1,590	19	5	760	192
Private						
U. Denver	10,581	8,543	92	747	774	425
Total	550,161	475,556	2,648	19,722	29,956	22,279
Louisville						
Public						
U. Louisville	135,873	70,481	6,872	3,754	34,620	20,146
IN U. all campuses[c]	355,004	170,635	5,060	6,219	120,465	52,625
Total	490,877	241,116	11,932	9,973	155,085	72,771
Minneapolis						
Public						
St. Cloud State U.	2,224	832	82	665	645	0
U. MN all campuses[d]	594,877	326,170	52,982	26,241	107,781	81,703
U. WI River Falls	434	257	54	12	79	32
Private						
Augsburg C.	579	579	0	0	0	0
Carleton C.	1,785	1,323	0	45	319	98
Macalester C.	2,351	983	0	0	1,300	68
Northwestern Health Sciences	820	800	0	0	0	20
St. Olaf C.	854	415	3	0	0	436
U. of St. Thomas (St. Paul, MN)	368	232	17	9	86	24
Total	604,292	331,591	53,138	26,972	110,210	82,381
Philadelphia						
Public						
Cheyney U. PA	278	278	0	0	0	0
Lincoln U. (Lincoln University, P	606	606	0	0	0	0
PA State U. all campuses[e]	644,182	367,215	69,552	89,170	117,119	1,126
Rowan U.	4,581	3,293	720	488	80	0
Rutgers, The State U. NJ all cam	308,204	129,456	35,937	9,542	103,370	29,899
Temple U.	79,736	50,904	5,125	5,210	11,632	6,865
U. DE	114,985	79,640	4,737	4,326	21,723	4,559
West Chester U. PA	244	167	29	45	0	3

Appendix B: Research and Development Expenditures (cont'd)

Metropolitan area & university	All R&D Expenditures, 2006 ($ in '000)	$ from federal government, 2006 (in '000)	$ from state and local government (in '000)	$ from industry (in '000)	$ from institutional funds (in '000)	$ from all other sources ('in 000)
Philadelphia (cont.)						
Private						
Arcadia U.	334	332	0	0	0	2
Bryn Mawr C.	4,254	998	10	10	3,236	0
Drexel U.	96,687	68,499	3,834	2,251	18,180	3,923
Haverford C.	967	514	0	0	121	332
La Salle U.	243	101	0	0	142	0
PA C. of Optometry	1,642	1,543	50	3	0	46
Philadelphia C. of Osteopathic	1,034	681	12	49	168	124
Philadelphia U.	858	759	99	0	0	0
St. Joseph's U.	3,037	2,566	13	0	124	334
Swarthmore C.	2,385	1,682	1	0	401	301
Thomas Jefferson U.	106,986	82,551	7,439	9,585	3,108	4,303
U. PA	676,052	478,773	6,564	38,347	64,229	88,139
U. of the Sciences Philadelphia	1,260	499	116	645	0	0
Ursinus C.	562	357	160	30	0	15
Villanova U.	7,122	5,039	330	975	0	778
Total	2,056,239	1,276,453	134,728	160,676	343,633	140,749
Pittsburgh						
Public						
PA State U. all campuses	644,182	367,215	69,552	89,170	117,119	1,126
U. Pittsburgh all campuses[g]	530,162	422,316	13,415	8,670	61,815	23,946
Private						
Carnegie Mellon U.	212,506	185,389	4,130	12,025	4,824	6,138
Duquesne U.	8,345	3,171	207	163	4,655	149
Total	1,395,195	978,091	87,304	110,028	188,413	31,359
Raleigh						
Public						
NC Central U.	6,597	6,597	0	0	0	0
NC State U.	330,936	131,262	86,543	41,959	67,784	3,388
U. NC Chapel Hill	443,790	329,215	17,996	7,391	89,188	0
Private						
Duke U.	657,080	414,419	17,906	132,996	69,103	22,656
Shaw U.	1,815	1,800	15	0	0	0
Total	1,440,218	883,293	122,460	182,346	226,075	26,044
Rochester						
Public						
SUNY C. Brockport	839	606	61	0	156	16
SUNY C. Geneseo	1,036	802	38	2	170	24
Private						
Rochester Institute of Technolc	22,107	14,581	550	2,042	3,975	959
U. Rochester	366,658	278,399	10,596	29,433	32,492	15,738
Total	390,640	294,388	11,245	31,477	36,793	16,737
Seattle						
Public						
U. WA	778,148	650,394	8,969	56,765	43,388	18,632
Private						
Seattle U.	800	477	0	21	142	160
U. Puget Sound	431	364	0	0	8	59
Total	779,379	651,235	8,969	56,786	43,538	18,851
Washington/Baltimore						
Public						
Bowie State U.	1,951	1,951	0	0	0	0
George Mason U.	50,381	35,911	877	761	9,233	3,599
Morgan State U.	13,523	12,199	310	110	834	70
St. Mary's C. MD	417	305	80	0	0	32
Towson U.	1,038	894	45	75	0	24
U. Baltimore	7,856	1,757	4,607	319	200	973
U. DC	5,065	3,813	804	0	439	9
U. MD Baltimore	405,260	186,160	27,634	33,772	111,416	46,278
U. MD Baltimore County	65,718	44,830	2,236	1,342	12,683	4,627
U. MD College Park	354,244	209,764	17,140	10,613	109,817	6,910
U.S. Naval Academy	6,850	6,487	0	363	0	0
Uniformed Services U. of the H	67,716	39,461	0	0	24,776	3,479
Private						
American U.	2,410	1,678	0	732	0	0
Catholic U. America, The	17,662	13,264	16	848	3,444	90
Gallaudet U.	2,013	1,959	54	0	0	0
George Washington U.	113,982	75,209	1,096	4,973	10,176	22,528
Georgetown U.	118,558	92,268	2,163	3,388	11,314	9,425
Howard U.	36,465	34,959	344	1,162	0	0
Johns Hopkins U., The[h]	1,499,977	1,307,453	5,830	25,162	69,960	91,572
Loyola C.	1,784	564	746	95	377	2
Total	2,772,870	2,070,886	63,982	83,715	364,669	189,618

Data Source: National Science Foundation

Appendix C: Nationally Recognized Faculty

The number of National Academy of Science members and faculty awards are provided by metropolitan region and school for 2005. Data are from the Center for Measuring University Performance (http://mup.asu.edu/research_data.htm).

Metropolitan area & university	National Academy Members, 2005	Faculty Awards, 2005
Austin		
Public		
Texas State University - San Marcos	--	2
University of Texas - Austin	56	25
Stephen F. Austin State University	--	1
Total	56	28
Baltimore		
Public		
University of Maryland - Baltimore	8	7
University of Maryland - Baltimore County	0	6
Towson University	--	1
Private		
Johns Hopkins University	73	63
Total	81	77
Buffalo		
Public		
State Univ. of New York - College at Buffalo	--	7
University at Buffalo	5	3
Total	5	10
Cleveland		
Public		
Cleveland State University	--	7
Kent State University - Kent	--	2
University of Akron - Akron	1	--
Private		
Case Western Reserve University	20	14
John Carroll University	--	1
Oberlin College	--	2
Total	21	26
Denver		
Public		
University of Colorado - Boulder	30	19
University of Colorado Health Sciences Center	10	--
University of Northern Colorado	--	1
Total	40	20
Louisville		
Public		
University of Louisville	1	7
Total	1	7
Minneapolis		
Public		
University of Minnesota - Twin Cities	36	23
Private		
Carleton College	--	4
Macalester College	--	1
St. Olaf College	--	1
University of St. Thomas (MN)	--	3
Total	36	32

Appendix C: Nationally Recognized Faculty (cont'd)

Metropolitan area & university	National Academy Members, 2005	Faculty Awards, 2005
Philadelphia		
Public		
Rutgers the State University of NJ - Camden	--	1
Temple University	--	3
University of Delaware	7	6
West Chester University of Pennsylvania	--	1
Private		
Bryn Mawr College	--	2
Drexel University	6	3
Haverford College	1	1
Thomas Jefferson University	5	1
University of Pennsylvania	83	26
Villanova University	1	2
Total	103	46
Pittsburgh		
Public		
University of Pittsburgh - Pittsburgh	24	30
Private		
Carnegie Mellon University	28	13
Duquesne University	0	1
Total	52	44
Raleigh		
University of North Carolina - Chapel Hill	35	30
Private		
Duke University	54	40
Total	89	70
Rochester		
Public		
State Univ. of New York - College at Geneseo	--	1
Private		
University of Rochester	27	14
Total	27	15
Seattle		
Public		
University of Washington - Seattle	85	29
Total	85	29
Washington D.C.		
Public		
Bowie State University	--	1
George Mason University	2	3
University of Maryland - College Park	27	20
Private		
American University	--	3
Catholic University of America	1	3
George Washington University	4	4
Georgetown University	5	10
Howard University	6	3
Total	45	47

Data Source: Center for Measuring University Performance

Appendix D: Data Sources and Notes

Scope and Methodology

Figure 1 — Peer Region Comparative Factors: Population size comes from the U.S. Census and reflects 2007. The number of colleges and universities within a region reflect all two- and four-year institutions of higher education. This includes schools such as ITT Technical, even though this institution isn't a member of the Western New York Consortium of Higher Education. At the same time, schools such as SUNY Empire, which have a presence in the study region, but are home-based outside the region, are excluded since it would have been an arduous process to attempt to identify and include similarly situated schools for peer regions. Data are from the National Center for Education Statistics Integrated Postsecondary Education Data System (http://nces.ed.gov/ipedspas/).

The following colleges and universities are included in the analysis as part of the tri-county Erie-Niagara-Cattaraugus CMSA:

Erie County (15 schools)

Bryant and Stratton College – Amherst
Bryant and Stratton College – Buffalo
Brant and Stratton – Lackawanna
Canisius College
Christ the King Seminary
D'Youville College
Daemen College
Erie Community College
Hilbert College
ITT Technical
Medaille College
University at Buffalo, SUNY
Buffalo State College, SUNY
Trocaire College
Villa Maria

Niagara County (2 schools)

Niagara County Community College
Niagara University

Cattaraugus County (2 schools)

St. Bonaventure University
Olean Business Institute

Rustbelt location was marked "yes" for regions located in the northeastern portion of the United States or where heavy, steel-based manufacturing was a core part of the economy.

A flagship university is generally the largest, nationally ranked university in a region, offering a range of undergraduate and doctoral-level programs.

The ongoing collaborative initiatives provided are those described in a forthcoming analysis of models of higher education partnerships, conducted by the University at Buffalo Regional Institute for the Western New York Consortium of Higher Education.

Findings: Benchmarking Higher Education in Buffalo Metro

a. ATTRACTING diverse, high-performing students

Figure 2 — Per Capita Student Enrollment: Number of full- and part-time students enrolled in fall 2006 per 100 population. Student data are from the National Center for Education Statistics Integrated Postsecondary Education Data System (http://nces.ed.gov/ipedspas/), while population data are from the U.S. Census Annual Estimates of the Population of Combined Statistical Areas: April 1, 2000 to July 1, 2007, Table 2 (http://www.census.gov/popest/datasets.html).

Figure 3 — Total Student Enrollment: Number of students enrolled in fall 2006. Data are from the National Center for Education Statistics Integrated Postsecondary Education Data System (http://nces.ed.gov/ipedspas/).

Figure 4 — Average Acceptance Rates: Total student admissions as a percentage of total applicants in 2006. Data are from the National Center for Education Statistics Integrated Postsecondary Education Data System (http://nces.ed.gov/ipedspas/).

Figure 5 — Median SAT Scores: Combined SAT math and reading scores of the middle 50 percent of first-year students. Data are from the College Board (http://www.collegeboard.com/).

Figure 6 — Out-of-State Enrollment: Percentage of first-time freshman having a state of residence that differs from that of the school when first admitted. Data reflect freshman admissions in fall 2005 and are from the National Center for Education Statistics Integrated Postsecondary Education Data System (http://nces.ed.gov/ipedspas/).

Figure 7 — Non-traditional Students: Percentage of total students enrolled in fall 2006 that are age 25 and over. Data are from the National Center for Education Statistics Integrated Postsecondary Education Data System (http://nces.ed.gov/ipedspas/).

Figure 8 — Part-time Student Enrollment: Percentage of total students that were enrolled part time in fall 2006. Data are from the National Center for Education Statistics Integrated Postsecondary Education Data System ()http://nces.ed.gov/ipedspas/.

Figure 9 — Higher Education Rankings: School rankings at the undergraduate level come from *U.S. News & World Report's America's Best Colleges 2008* (print edition). Graduate and professional school rankings (for law, medicine, business and engineering) are from *America's Best Graduate Schools 2009* (print edition). Overall quality rankings by region, with points assigned based on institutions' rankings at the undergraduate, graduate and professional levels, follow the index developed by the Pennsylvania Economy League in *Greater Philadelphia's Knowledge Industry: Leveraging the Region's Colleges and Universities in the New Economy.*

U.S. News & World Report rankings of baccalaureate and master's level schools are based a school's performance in seven broad categories: 1) student selectivity, 2) faculty resources, 3) results of a peer

assessment survey, 4) student retention, 5) financial resources, 6) graduation rate performance and 7) alumni giving. Ranking of graduate and professional schools reflect a combination of statistical and assessment data. Statistical data incorporate educational inputs such as student quality and faculty resources as well as outputs such as student performance after graduation. Assessments reflect feedback from academia and practitioners.

As classified in the *U.S. News & World Report* rankings, national universities provide a range of undergraduate majors as well as master's and doctoral degrees, often with a strong emphasis on research. Liberal arts colleges focus on educating undergraduates and award at least half of all degrees in liberal arts fields. Master's and baccalaureate colleges are ranked by geographic area (North, South, Midwest and West). Master's universities offer a range of programs, but few doctoral-level programs, if any. Like liberal arts colleges, baccalaureate schools focus on undergraduate education, but grant fewer than half of degrees in liberal arts fields.

Figure 10 — National Education Quality Index: Points are granted to a region based on the number of institutions within the region that are ranked according to the classifications shown. This index follows that used the Pennsylvania Economy League in *Greater Philadelphia's Knowledge Industry: Leveraging the Region's Colleges and Universities in the New Economy*.

Figure 11 — Quality Index Scoring: Total points were calculated by applying the point system provided in Figure 10 to the rankings of colleges and universities in *U.S. News and World Report's America's Best Colleges 2008* and *America's Best Graduate Schools 2009.* Undergraduate rankings at the regional level include best baccalaureate colleges and best master's-level universities.

b. EDUCATING for the knowledge economy

Figure 12 — Health Sciences Degrees: Percentage of total degrees conferred in 2005-06 that were in the field of health. Data are from the National Center for Education Statistics Integrated Postsecondary Education Data System (http://nces.ed.gov/ipedspas/.

Figure 13 — University Research Spending: Total university research and development expenditures in the fields of science and engineering per FTE student. Research expenditures reflect spending in 2006 and come from a report compiled by the National Science Foundation, *Academic Research and Development Expenditures, Fiscal Year 2006, N*ovember 2007 (http://www.nsf.gov/statistics/nsf08300/). The number of full-time equivalent students comes from the National Center for Education Statistics.

Figure 14 — Federal Research Support: Percentage of total university research and development expenditures for science and engineering that were supported by federal government funding in 2006. Data are from a report compiled by the National Science Foundation, *Academic Research and Development Expenditures, Fiscal Year 2006, N*ovember 2007 (http://www.nsf.gov/statistics/nsf08300/).

Figure 15 — Faculty Recognition: National Academy of Science members reflect both active and emeritus members, as reported in the online membership directory of the National Academy of Science

during fiscal year 2005. Data come from the Center for Measuring University Performance (http://mup.asu.edu/research_data.html). Faculty awards reflect a number of prestigious grant and fellowship programs in the fields of arts, science, engineering and health. Examples include Fulbright American Scholars, Guggenheim Fellows, MacArthur Foundation Fellows, Pew Scholars in Biomedicine, Robert Wood Johnson Policy Fellows, and Woodrow Wilson Fellows. Data reflect fiscal year ending in 2005 and come from the Center for Measuring University Performance (http://mup.asu.edu/research_data.html). Faculty recognitions include both national academy of science members and faculty awards per 1,000 full-time equivalent faculty in the region.

Figure 16 — Patent Generation: University patents granted reflect the number of patents granted to universities within a regions in 1999. This includes patents generated at the University at Buffalo and granted to the SUNY Research Foundation. Total contributing universities reflects the number of universities granted one or more patents during 1999. University patents as a percentage of the total in the region was calculated by dividing the number of university patents granted by the total number of utility patents granted in the region. Utility patents are issued for "the invention of a new and useful process, machine, manufacture, or composition of matter, or a new and useful improvement thereof." About nine out of 10 patents issued are utility patents. All data are from the U.S. Patent and Trademark Office (http://www.uspto.gov/).

Figure 17 — Top Patent Generators: Top two patent generators from the region's corporate sector in 1999. Numbers in parentheses reflect patents granted to these companies in 1999. Percent total patents was calculated by dividing the number of utility patents granted to businesses in a region, as shown, by the total number of utility patents granted in the region in 1999. All data are from the U.S. Patent and Trademark Office (http://www.uspto.gov/).

c. RETAINING graduates for the regional workforce

Figure 18 — Brain Drain: Number reflects the ratio of the population age 18 to 24 that has a college degree or is working on one to the population age 26 to 34 with an associate's degree or higher. This formula is similar to the brain drain/gain index developed by Richard Florida in *The University and the Creative Economy*, 2006. A ratio of one indicates that a region is retaining as many students as it attracts to its area colleges and universities (and that it gains one for each it loses). ata are from the 2000 U.S. Census (http://www.census.gov/).

Figure 19 — Housing Cost: Dollar figures reflect the median sales prices (in thousands of dollars) of existing single-family homes by metropolitan statistical area in 2007, as compiled by the National Association of Realtors (http://www.realtor.org/research/research/ehspage).

Figure 20 — Commute Time: Numbers reflect the average travel time to work for workers ages 16 and up who didn't work at Home. Data are from the 2003 American Community Survey (http://www.census.gov/acs/www/Products/Ranking/2003/R04T160.htm).

Figure 21 — Declining urban core: Percentage change in the region's central city between 2000 and 2006, as provided by the U.S. Census Annual Estimates of the Population for Incorporated Places Over 100,000, Ranked by July 1, 2006 Population: April 1, 2000 to July 1, 2006, released June 2007 (http://www.census.gov/popest/cities/SUB-EST2006.html).

Figure 22 — Population diversity: Percentage of the region's total population that is 1) not white or Hispanic or 2) foreign born. Data are from the 2000 U.S. Census ((http://www.census.gov/).

Figure 23 — Professional and Technical Employment: Percentage of total 2005 employment that consists of jobs in professional and technical services or in the fields of information, finance and insurance. Data are from the Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce (http://www.bea.gov/regional/).

Figure 24 — Average Wages: Average wages reflect the average wage per job in the region in 2006. Data are from the Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce (http://www.bea.gov/regional/). Adjusted wages adjust for the higher or lower cost of living in comparative regions relative to Buffalo, as determined by CNN Money's Cost of Living Calculator (http://cgi.money.cnn.com/tools/costofliving/costofliving.html). For example, if a salary of $20,000 in Buffalo is equivalent to $15,000 in Austin, then the average wage in Austin was multiplied by 1.33 (20/15) to adjust for Austin's relatively lower cost of living.

Figure 25 — Self Employment: Percentage of total 2005 employment that is nonfarm proprietor employment. Data are from the Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce ((http://www.bea.gov/regional/).

Figure 26 — Ranking as a Place for Business and Careers: Number reflects the region's ranking on Forbes's Best Places for Business and Careers (http://www.forbes.com/2008/03/19/best-business-cities-biz-bestplaces08-cx_kb_0319places_land.html). Released in March 2008, the rankings include the 200 largest metro areas and are based on a region's performance across nine areas: 1) five-year historical job growth, 2) income growth, 3) business costs, 4) living costs, 5) migration trends, 6) crime, 7) educational attainment, 8) presence of four-year colleges and 9) cultural and recreational opportunities within the region.