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Evaluating Higher Education Excellence using the 3Ts: Creation and Attraction of Technology, Talent and Tolerance by Ontario Colleges and Universities

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Evaluating Higher Education Excellence using the 3Ts: Creation and Attraction of Technology, Talent and Tolerance by Ontario Colleges and Universities

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1. Introduction

Renewed interest and attention to higher education institutions was provoked by the fact that several cities all around the world attempted the innovation challenge. Universities and colleges have a great impact on the creation of innovative processes through the development of scientific research. They also have a great deal of influence on the enhancement of the future *knowledge workers'* group, which is one of the main engines of the economy of cities. Therefore, universities and colleges are the places where knowledge is created, young minds are trained and culture is transmitted. For these reasons they represent one of the agents which can influence the economic development of a country, a region or a metropolitan area (Boffi & Sadini, 2008; Singh & Allen, 2006).

The great importance of education for the future of a country is testified, for example, by a huge protest organized by students, teachers and citizens in Italy, a nation which always was looked at as the cradle of civilization. The reaction of the Italian population was provoked by the law n.133/08, approved October 29, 2008. With this law the Berlusconi Government will activate a wild cut in public funding and a dramatic reduction of the turnover of teachers. With the new Government these political decisions show lack of recognition of the strategic role which education, higher education and R&D play in the development of the country. Even if Canadian and European educational systems are quite different, the recognition of the huge importance of education, not only in itself for the single individuals but also for the social community in its broader sense, would be the same.

These events in my country, Italy, bring me to think about the parameters of the quality of higher education institutions. The word "quality" in itself is very controversial and for this reason I will try to delineate it using the 3Ts approach. My case study will be the province of Ontario.

In these pages I will analyze the role of post secondary institutions (colleges and universities) in Ontario, the mega region of Tor-Buff-Loo-Mon-Tawa; in order to understand the footprint of the universities and colleges on the province. Several studies have shown how the analysis of the post secondary institutions inside a metropolitan area cannot be restricted to their commercial functions, such as the counting of inventions and patents. Analysis must also take into account the social impact: the creation of new talent, the ability to attract people with a high level of human capital to the region and the development of diverse, open-minded and inclusive environments (Florida, Knudsen, Stolarick, forthcoming; European University Association, 2007; Longworth, 2004). In this regard, I will focus my attention on three main dimensions: Technology, Talent and Tolerance. The 3Ts (Technology, Talent and Tolerance) are part of a larger theory of economic development used to better understand the longer-term potential of sub-national regions. The 3Ts make up a triad of 'must haves' for any region to be successful in the Creative Economy. Each T is necessary, but not sufficient condition to produce innovation, foster economic growth, and attract creative and talented people. Intuitively, places where there is cohesiveness, high rates of educated people and developed industry sectors can grow faster than places where these elements are absent (Florida, 2002).

Universities and colleges due to their structure, relatively large populations and operating budgets can be thought of and analyzed according to a similar system. I will examine them from two perspectives: 1) Creation/Generation and 2) Attraction/Retention. The presence of technology, talent and tolerance only is insufficient to understand what the current situation is and the possible future development of the Ontario Industry. The relationship between universities and colleges and the environment where they are located is crucial.

In particular, I will look at:

1. Technology

Higher education institutions, in particular universities, are centers where cutting-edge research, new technologies and spin-off companies are developed.

Concerning the Creation/Generation side I will look at the innovation data in terms of the relationship between universities and industries and their capability of technology transfer. The Attraction/Retention side will be handled looking at the spatial concentration of high-tech industries and their output.

2. Talent

Universities and colleges are very strong talent attractors. Graduate students are, for example, attracted by the appeal of eminent researchers

and professors by the universities. Higher education institutions are also able to generate and attract new companies.

I will analyze the Creation/Generation using the data concerning the numbers of and the careers of students enrolled, and professors employed. From the Attraction/Retention point of view, I will use the data inherent to human capital and Creative Class present at the mega region scale.

3. Tolerance

A progressive, open minded and tolerant climate helps attract and retain the so-called Creative Class¹. Higher education institutions can help to create a good environment for attracting a diverse group of people.

The Creation/Generation of a tolerant environment can be more deeply analyzed through the data on the composition of student and faculty populations. As the presence of heterogeneous populations of students and professors is not *conditio sine qua non* to the development of a culture which was inclusive and open to diversity; it is also necessary to analyze the general population data from Statistics Canada about the presence of workers in the so-called bohemian occupations, gay and lesbian couples, the size of the foreign born population and the racial composition of the region as a whole.

Education is like a seed which if sowed in the wrong ground risks producing bad fruit or worse, to die (Jacobs, 1969). For this reason, an analysis about the current situation of Ontario is needed. A study of the interrelationship between higher education institutions (colleges and universities) and the province of Ontario from the perspective of Technology, Talent and Tolerance will be useful in order to analyze and discover what the strengths and the weaknesses of the Province are. In these pages I will present a first analysis of this theme, trying to give a general overview of the topic.

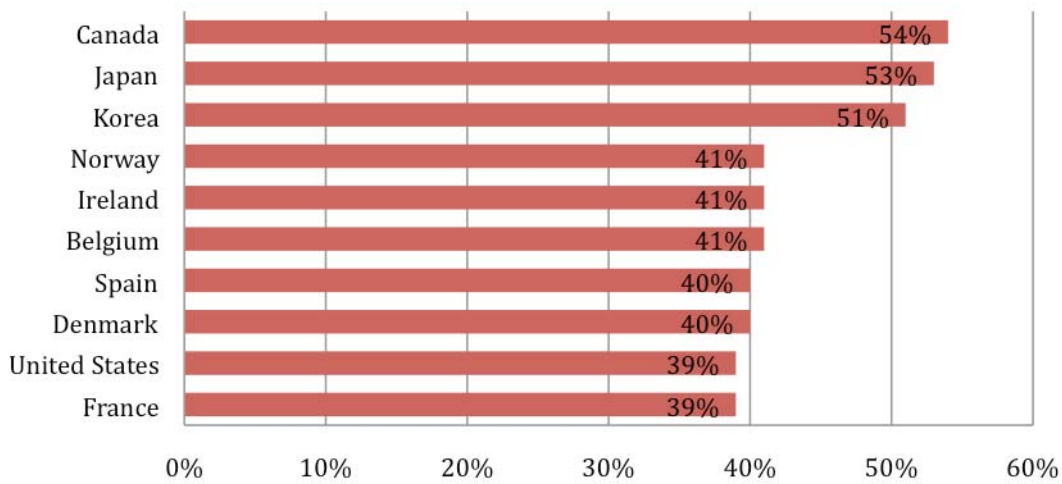
2. Canadian educational framework

According to the OECD, Canada is the country with the highest average of postsecondary educational attainment (54%), immediately followed by Japan (53%) and Korea (51%). The importance of post secondary education is related to the fact that “students are the canaries of the global competition for talent” (Florida, 2007). This means that countries which are focused on providing

¹ The composition of the Creative Class could be defined using the acronym TAPE: T for technology and R&D, A for arts and culture professionals, P for professional and managerial sectors and E for educating and training fields (Kevin Stolarick Lecture, *The 3Ts are your friend*, MPI, Toronto, 18th July 2008.)

cutting edge colleges, university graduates with master's and doctorate degrees not only train their young citizens to be more skilled and competitive but also have more chances to attract students from other countries and therefore, to gain advantages in global economic competition. However, having advanced programs is not enough to attract these groups of people. A university which does not provide an open and diverse environment, as well as a good relationship with industry, cannot rely only on its educational programs in order to succeed.

Graph.1-Top ten OECD countries according to postsecondary educational attainment



Source: Environmental Scan, 2008. Colleges Ontario

Canada's population has the highest rate of post secondary attainment of all the industrialized countries; 26% of the adult population (25-64 years old) in Ontario has a university or college degree. This percentage is the highest among all provinces and territories. The province of Ontario hosts 20 universities (located in 14 cities) and 24 colleges (located in 21 cities), which are public funded (Tab.1 and 2 in appendix).

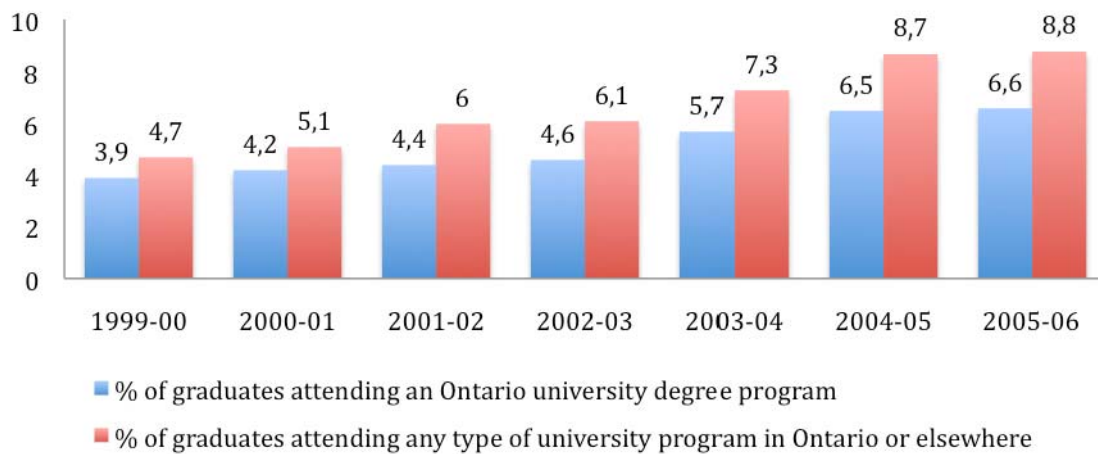
The relationship between colleges and universities is very important. Provinces and cities, which provide strong higher education alternatives, have greater chances of retaining their graduates. The percentage of graduates at the Ontario colleges, which decided to continue their studies, is increasing every year, rising from 4.7% in 1999-2000 to 8.8% in 2005-2006. The percent of graduates who chose to stay in Ontario for their university degree was 6.6% in 2005-2006. One of the goals that Ontario has to achieve is not only to attract university students from other provinces and countries but also to retain those who were already settled here to obtain their degree.

A good strategy in order to improve the quality of higher education institutions and retain the students is to increase the communication and relationship between universities and colleges. With this purpose several institutions have

developed joint programs, such as the Business, Computing and Media Programs at the University of Guelph-Humber; the Art and Art History, and Theatre and Drama between the University of Toronto at Mississauga and Sheridan College; the Journalism and New Media Programs between the University of Toronto at Scarborough and Centennial College, the Communication Arts and Nursing at Seneca at York.

The following paragraphs will analyze higher education institutions using each of the three Ts: Technology, Talent and Tolerance.

Graph.2-College graduates attending University by year



Source: Environmental Scan, 2008. Colleges Ontario

3. Technology

Technology deals with new firms and the ability of regions to transform the knowledge created by a talented workforce into commercially valuable products and services. In particular, my analysis will be focused on universities because of their close relationship with enterprises, industries and laboratories of research and development. The so-called technology transfer represents the ability of universities to communicate with enterprises and to transfer the findings from laboratories to industries. For this reason the commercialization of scientific discoveries has been discussed (Agrawal, 2007). There are several channels through which it is possible to transfer inventions from university labs, and they are not necessarily linked to technology, as it is commonly defined. In our definition of Technology, the Information Technology (IT) is not the only aspect which is included; rather we refer to a broader sense of innovation. Thus, we should look at “patents and licenses, the recruitment of graduate students, the co-supervising of graduate students, publications, conference presentations, consulting, informal conversations, and collaborative research” (Agrawal, 2007: 5).

Concerning the Creation/Generation of Technology inside the universities of Ontario I refer to the Council of Ontario Universities Survey (CUDO) and the data collected by the Association of University Technology Managers (AUTM). AUTM conducted a survey on the Academic Technology Transfer. In total, 34 Canadian institutions answered (12.8% of the total), 15 of which are located in Ontario (44%). Eleven universities out of twenty were involved and four R&D centers².

The Ontario' Universities in AUTM

Lakehead Univ. City: Thunder Bay	Univ. of Ottawa City: Ottawa
McMaster Univ. City: Hamilton	Univ. of Toronto City: Toronto
Queen's Univ. City: Kingston	Univ. of Waterloo City: Waterloo
Ryerson Univ. City: Toronto	Univ. of Western Ontario & Lawson City: London
Trent Univ. City: Peterborough	Wilfrid Laurier Univ City: Waterloo
Univ. of Guelph City: Guelph	

R&D Centres

The Ontario' Institution	Description
The Centre for Research in Earth and Space Technology (CRES Tech) City: North York	CRES Tech conducts multidisciplinary collaborative research and development in space and earth sciences.
Robarts Research Institute City: London	Robarts Research Institute is a non-profit medical research facility. Physicists, physicians, biologists and biomedical engineers work together to investigate heart disease, stroke, diabetes, Alzheimer's and many forms of cancer.
The Hospital for Sick Children City: Toronto	The Research Institute at The Hospital for Sick Children conducts research activities coordinated under seven major research programs that undertake internationally competitive research and training in areas of

² For a comparison between Canada and US see Agrawal, 2007.

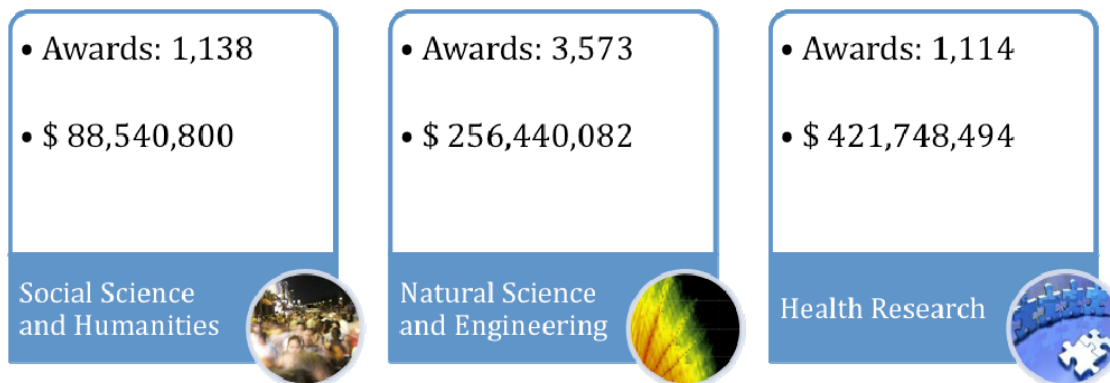
	research relevant to child health in its broadest sense.
University Health Network (UHN) City: Toronto	Toronto General Hospital, Toronto Western Hospital and Princess Margaret Hospital come together to achieve a common purpose and vision. UHN is among the ranks of the world's leading providers of exemplary patient care and innovative research and teaching.

I am going to analyze the data about: the awards received by institutions and R&D expenditures; licensing; invention disclosures; patents; and start-ups.

Awards

Ontario is investing a lot of energy into the field of health care. The best results to date come from the Natural Science and Engineering fields. McMaster University, in Hamilton for example, excels in these sectors as well as Queen's University in Kingston. The University of Western Ontario in London is doing very well both in social sciences and health care. The Universities in Toronto³, despite the large amount of funding, are ranked in the middle of Ontario's universities according to the number of awards received.

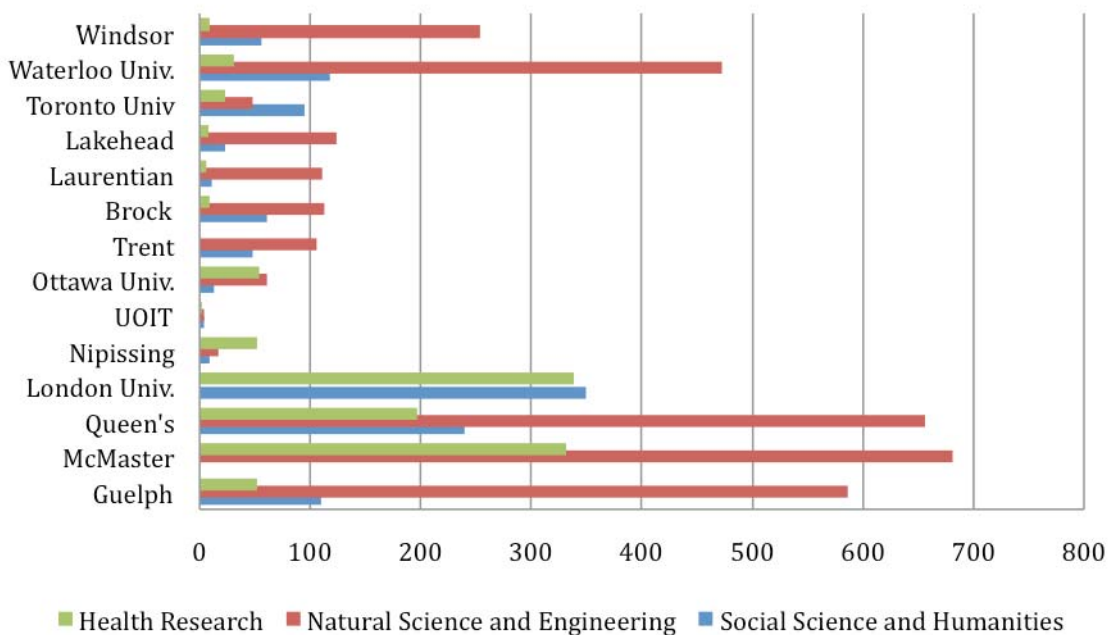
Figure.1- Number of awards and funding which the Ontario Universities received: Social Science and Humanities, Natural Science and Engineering and Health Research (2006-2007)



Source: CUDO survey, 2006

³ For comparison, I will often group the universities in the city of Toronto to explore the metropolis as a whole. London Univ. refers to both The University of Western Ontario & Lawson and is grouped for same reason.

Graph.3- Number of awards in Health Research, Natural Science and Engineering, Social Science and Humanities, in 2006-2007

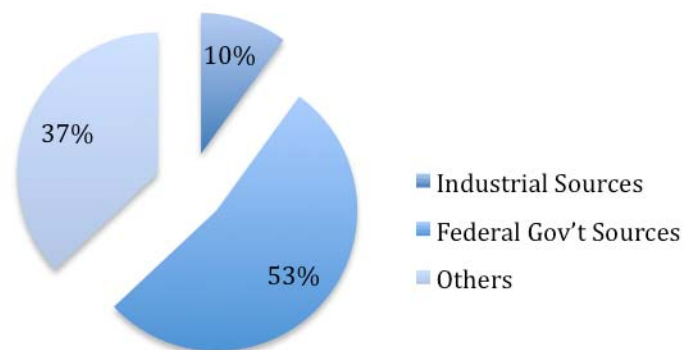


Source: CUDO survey, 2006

R&D expenditures

Total research expenditures in the fiscal year 2004 were \$1,239,109,237 CDN and of this, 53% were sponsored by federal government sources. University technology and regional innovation can influence each other; but may not. Strong university innovation is not necessarily translated into strong local high-tech industries. In 2004 Ontario spent over \$11.7 billion on R&D (45% of total R&D expenditures in Canada) and counts almost 90,000 full-time employees in this sector. It is important to note that these data have consistently increased over the past 10 years.

Graph.4- Research expenditures in 2004



Source: Elaboration on AUTM data, 2004

Licensing

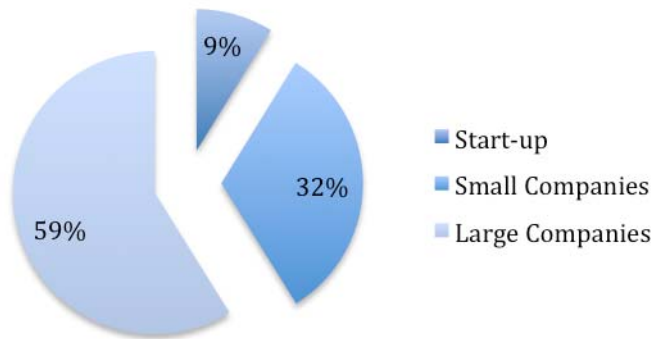
A license is a contract that grants explicit rights to a legal entity to use an intellectual property that is the exclusive rights to a certain creative work, commercial symbol, or invention. “A license agreement formalizes the transfer of technology between two parties, where the owner of the technology (the licensor, in this case, the inventing university), permits the other party (the licensee) to share the rights to use the technology” (Agrawal, 2007:9). In Ontario, 226 licenses/options were executed in the fiscal year 2004 at the 11 universities which participated in the AUTM survey.

Participating Universities

McMaster Univ.	65
Univ. of Guelph	39
Univ. of Toronto	38
Univ. of Waterloo	37
Univ. of Western Ontario & Lawson	30
Queen's Univ.	8
Univ. of Ottawa	7
Lakehead Univ.	2
Ryerson Univ.	0
Trent Univ.	0
Wilfrid Laurier Univ.	0
TOTAL	226

Of the 226 licenses, 31% were exclusive, 69% were non-exclusive. 41.2 % were with newly formed or existing small companies (less than 500 employees) and 32.3% with large companies.

Graph.5-Licenses/options executed

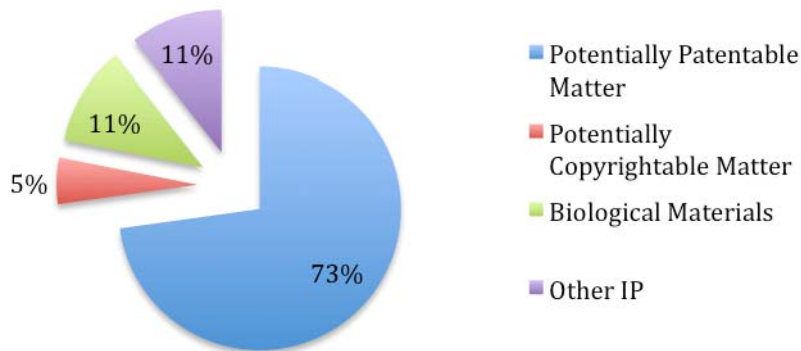


Source: Elaboration on AUTM data, 2004

Invention disclosures

An invention disclosure is a document where the title of the invention, the inventor, the circumstances and date of conception, the description of the invention and the testing results are reported. The 11 Ontario Universities received 471 invention disclosures in 2004 of which 72.8% were for potentially patentable inventions. Copyrightable, biological and other disclosures constituted the remaining 27.2%. In ten years the number of invention disclosures increased by approximately 68% (Agrawal, 2007).

Graph.6-Invention Disclosures received

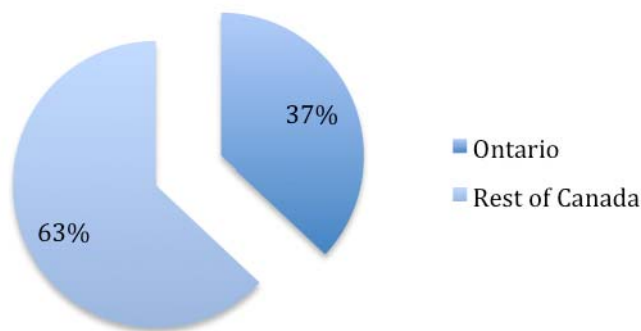


Source: Elaboration on AUTM data, 2004

Patents

A patent is a set of exclusive rights granted by a country to an inventor for a fixed period of time in exchange for a disclosure of an invention. 34 Canadian Institutions reported 572 new patent applications filed, the 11 Ontario Universities generated 37% out of those. Ontario is the province which, in Canada, produces the largest number of patents (39.2%). This percentage has increased by about 169% in ten years (Agrawal, 2007).

Graph.7-Total Patent Applications Filed



Source: Elaboration on AUTM data, 2004

Start-ups

Start-up companies are newly created and are at the very beginning of their business life. During this phase they develop their business and look for markets. In 2004, the 11 Universities in Ontario formed 20 start-up companies, approximately 50% of all Canadian start-ups for that time period.

The case studies presented in the AUTM Canada Report 2004 about the new products and technologies resulting from Canadian research activities included three cases from the Ontario participants. In the healthcare and public safety fields, Queen's University (Kingston); concerning the new technologies applied to the environment, the case of the University of Waterloo was shown.

The number of start-up companies initiated per year does not appear to have increased substantially over 10 years, even if the perception is different. The universities seem to have more and more invested in the commercialization of science and technology over the last few years but current data do not show a big change. This funding could also be influenced by the definition that AUTM gives to start-ups. Start-up companies are only those that were dependent upon licensing the institution's technology for initiation. Technologies and companies which are licensed to an already existing start-up or that are started without going through the technology transfer office, are not considered as start-up initiatives (Agrawal, 2007).

To conclude the investigation of the first T, Technology, I conducted a statistical analysis to better understand the relationship between university technology and Ontario high-tech industries. To assess university production of technology, in particular, I used the data collected by the AUTM Canada Report: licensing income, invention disclosures, patent applications and start-ups. For the Ontario high-technology situation I looked at data collected by the Martin Prosperity Institute: Tech Pole Index and Patents Count. The Tech Pole Index indicates the concentration of high-tech industry in the CMAs taken into consideration; and it is based on the high-tech location quotient as well as the metro areas proportion of national high-tech output. My analysis was restricted to nine CMAs; Ottawa-Gatineau, Kingston, Peterborough, Toronto, Hamilton, Kitchener, Guelph, London and Thunder Bay that made up the AUTM report. Looking at the correlations, it is clear that the results are very similar among each other. In both cases the correlations are always positive and very strong in invention disclosures and patent applications cases.

First, an analysis of the relationship between industry and university has been investigated. Ontario holds a preeminent role inside Canada's capacity to produce technology. As in the rest of the country, also in Ontario the commercialization of scientific contents has increased over the past 10 years (Agrawal, 2007). However, the inputs increased more than the outputs process of commercializing technology. This data clearly explain how stronger investments do not necessarily correspond to more significant results and revenues. Resources are important but not sufficient for better results in the process of commercialization of science from University to industry. According to Agrawal (2007), besides the accessibility to resources, there are three other factors that can influence technology transfer: favourable national policies, supportive academic culture, and proximity to "anchor tenants". These determinants are possible thanks to the attainment of practical objectives, such as a simpler bureaucracy and experience gained.

4. Talent

The concept of Talent refers to individual skills and human capital concentrated in a specific place, which could be a university, a city, a metropolitan area, a province, etc. Several scholars demonstrated that places with higher concentrations of human capital grow faster and are able to attract more highly educated people. The clustering of talented people is very important for the economic development of a region (Jacobs, 1969; Lucas, 1988; Glaeser, 1994; Florida, 2002).

In this section I look at the Creation/Generation and the Attraction/Retention of Talent by the post secondary institutions. To do that we use enrolment numbers, degrees and employment rates of faculty by educational attainment.

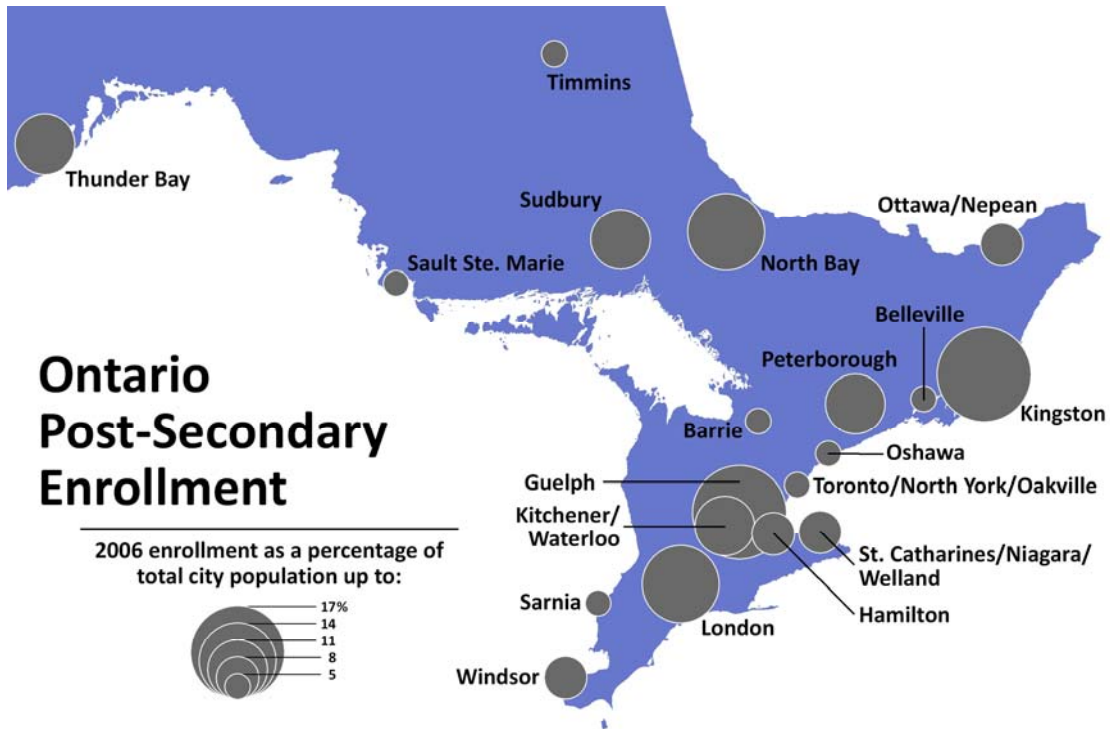
In 2006 the population of students attending Ontario post secondary institutions was 432,142, roughly 6% of the total population of the province; of that 182,245 or 42% were the students enrolled in colleges. The size and division of Ontario post secondary students is interesting for a number of reasons.

First, it helps to contextualize the analysis of post secondary institutions, to ensure that we do not overestimate or underestimate the reality. Metropolitan areas such as Toronto host a very high number of students (224,860); but if we look at these numbers in relation to the total size of the CMA, we see that the presence of post secondary students constitutes only 2.9% of the population. Instead, places like Guelph (17%), Kingston (15.5%), London (13.2%), North Bay (12.6%) and Waterloo (12.2%) have a considerable presence of post secondary students in their regions. Therefore, the post secondary students constitute those which Martinotti (1993) calls non-resident populations (*city users*) and have a crucial role in the so-called contemporary metropolis. The presence of students can be both a cause and effect of the allocation of right *hard* and *soft* factors⁴, which attract or eventually retain those people inside the city. Students are one of the main population groups in the metropolitan fluxes and one of the most dynamic components of the urban populations; thus they contribute to the changes which occur inside the post-metropolitan cities⁵ (Soja, 2000).

4 *Hard factors* are, for example, the availability of a labor force and office spaces, accessibility, and a local and regional tax regime. *Soft factors* include an attractive residential environment, tolerance and alternative lifestyles, a lively cultural scene, and the presence of meeting places for business and leisure purposes where the flow of knowledge and information takes place.

5 “The postmetropolitan city is defined by its heterogeneity, by the presence of a diverse range of old and new ethnic groups ... the postmetropolis is the product of immigration.” (Stolar, 2005: 122)

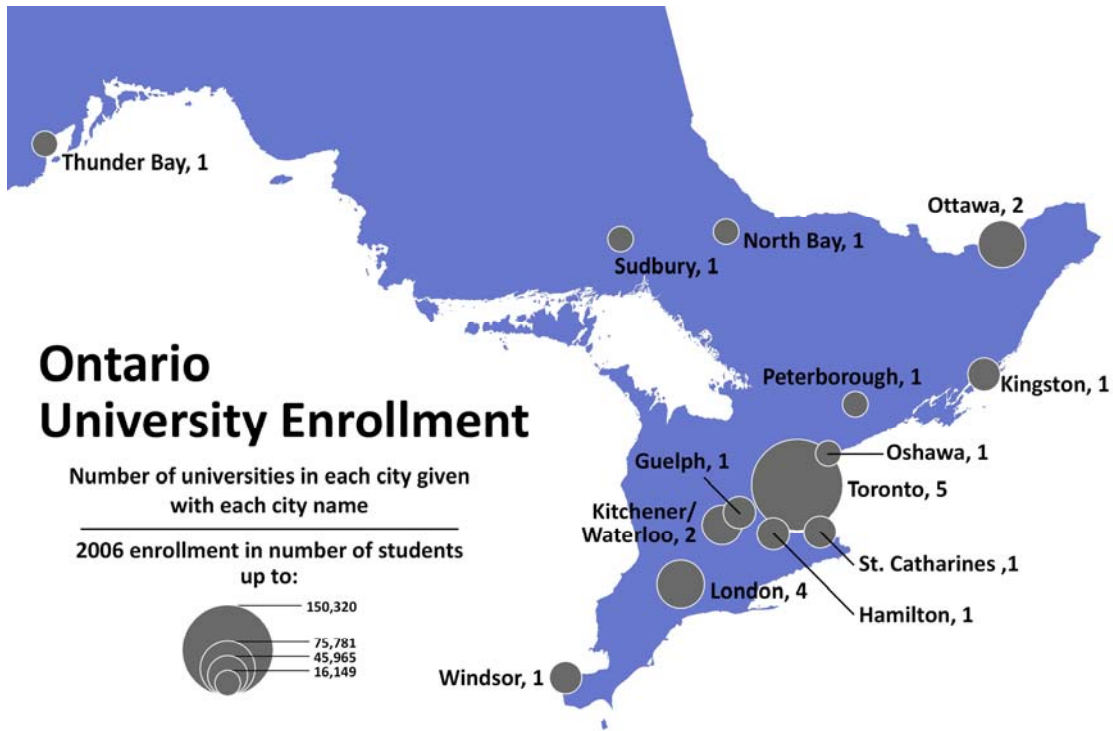
Map 1- Population of the Post-secondary students in Ontario (2006-2007)



Source: Elaboration of Martin Prosperity Institute (P. Raposo) on CUDO survey (2006) and Environmental Scan (2008)

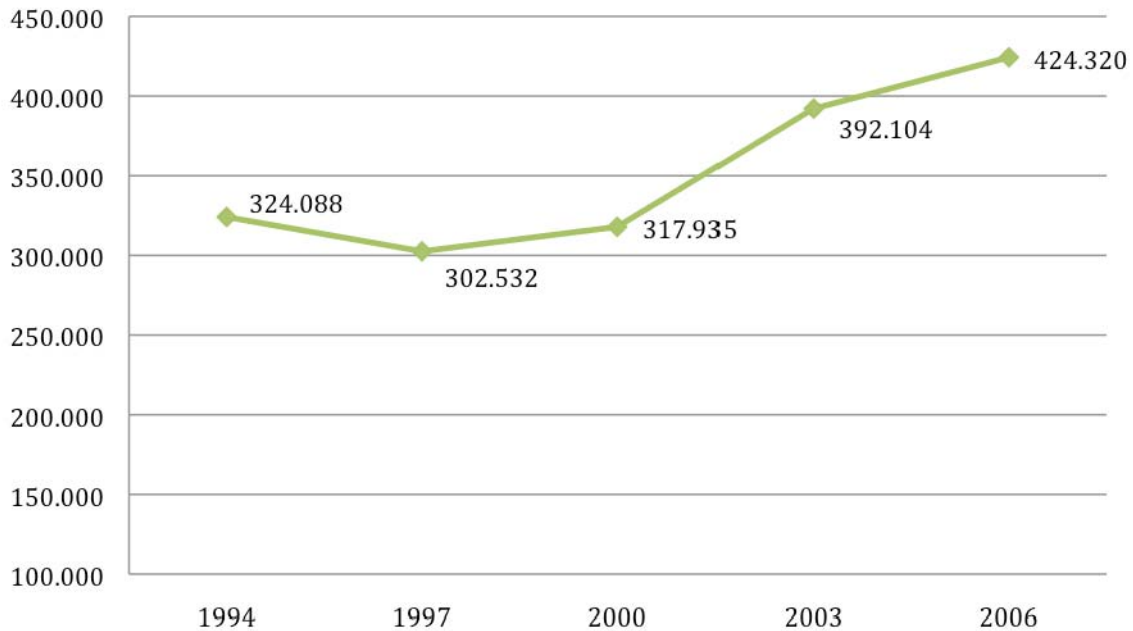
Looking at the trend in enrolment we can understand how this population is getting more and more numerous. In particular, between 2000 and 2006 the number of full and part time students enrolled in the Ontario universities increased by 33.5%.

Map 2- Population of the University students in Ontario (2006)



Source: Elaboration of Martin Prosperity Institute (P. Raposo) on CUDO survey (2006)

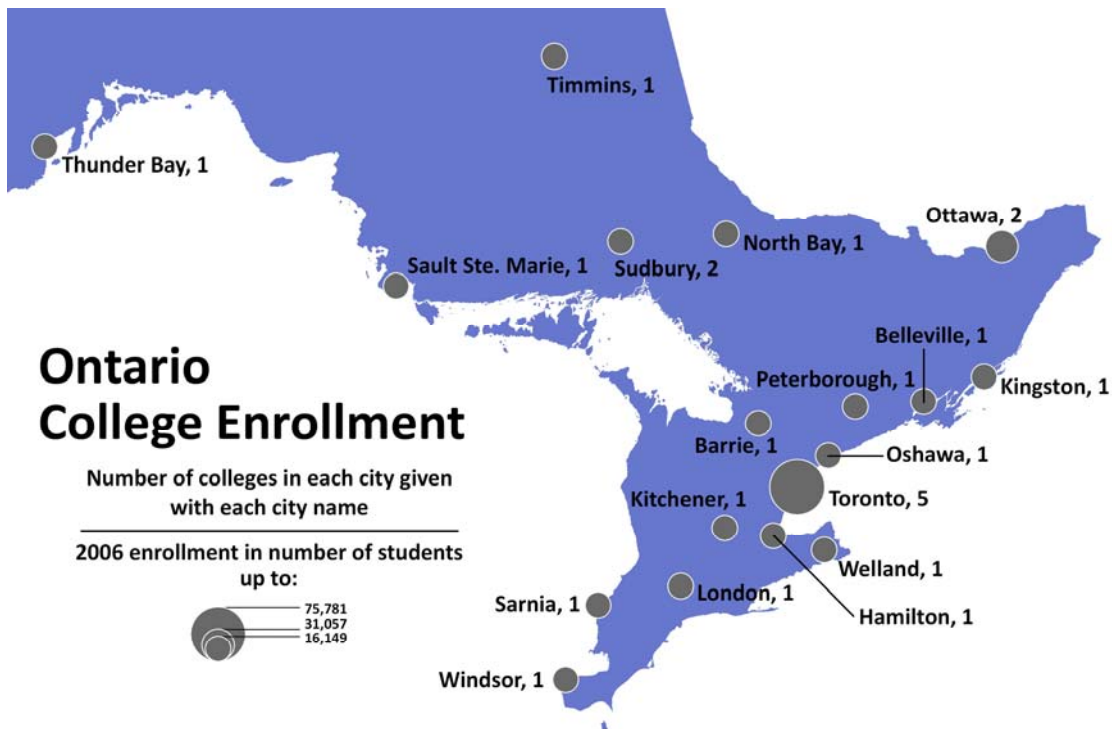
Graph.8-Full and Part-Time Undergraduate and Graduate Student enrollment, trend



Source: Elaboration on CUDO data

In 2005-2006, Ontario colleges produced 59,029 graduates. The graduates surveyed by the Ministry of Training, Colleges and Universities (MTCU) declared a fairly low percentage of subsequent enrolment in university. The programs that showed the lowest participation were: Preparatory Health, Science, Business Administration and Police Foundation. Instead, General Arts and Science is the program for which the subjects had the greatest participation when attending the university.

Map.3 - Full-time equivalent (FTE) enrollment at the 24 colleges (2006-2007)

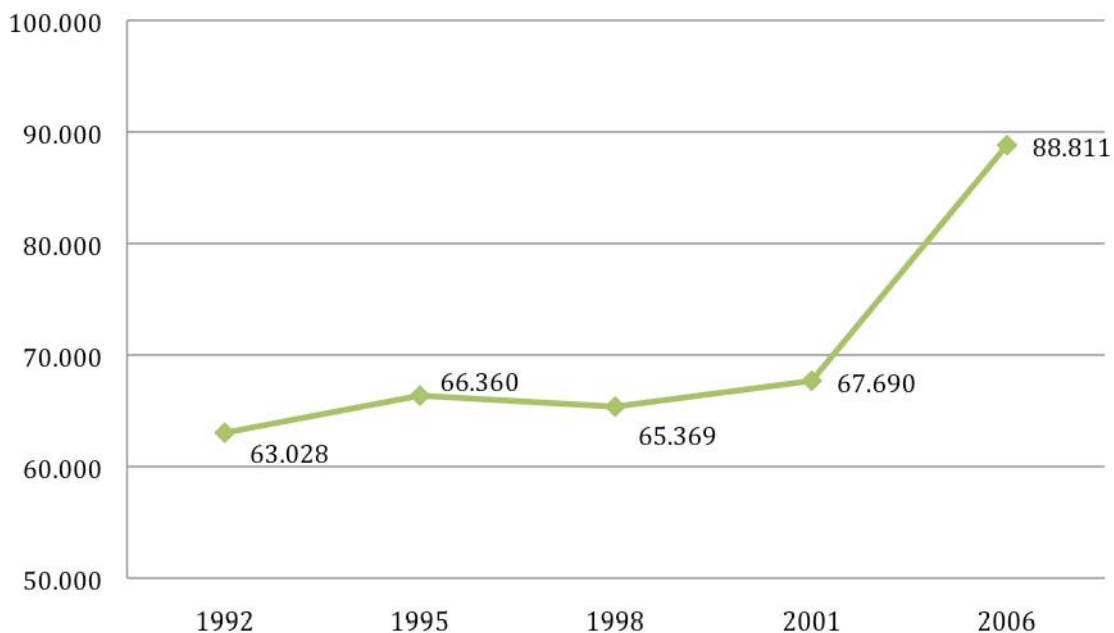


Source: Elaboration of Martin Prosperity Institute (P. Raposo) Environmental Scan (2008)

In 2006 the number of degrees awarded in Ontario was 88,811: 2.5% of under certificates, 0.6% of under diplomas, 66.9% of bachelor degrees, 13.6% of II entry of professional degrees, 14.3% of masters, and 2.1% of doctorates.

The trend of the enrolment and also the trend of the degrees awarded show a strong increment. The percentage increase in graduates from 2001-2006 was 31.2%. Concerning this percentage, it is important to highlight the fact that 2001 was the last year in which there was Ontario Academic Credit (OAC); this fact provoked a double cohort effect which may have had an influence on the increase in graduates.

Graph.9-Degrees awarded (undergraduate and graduate). Trends (1992-2006)

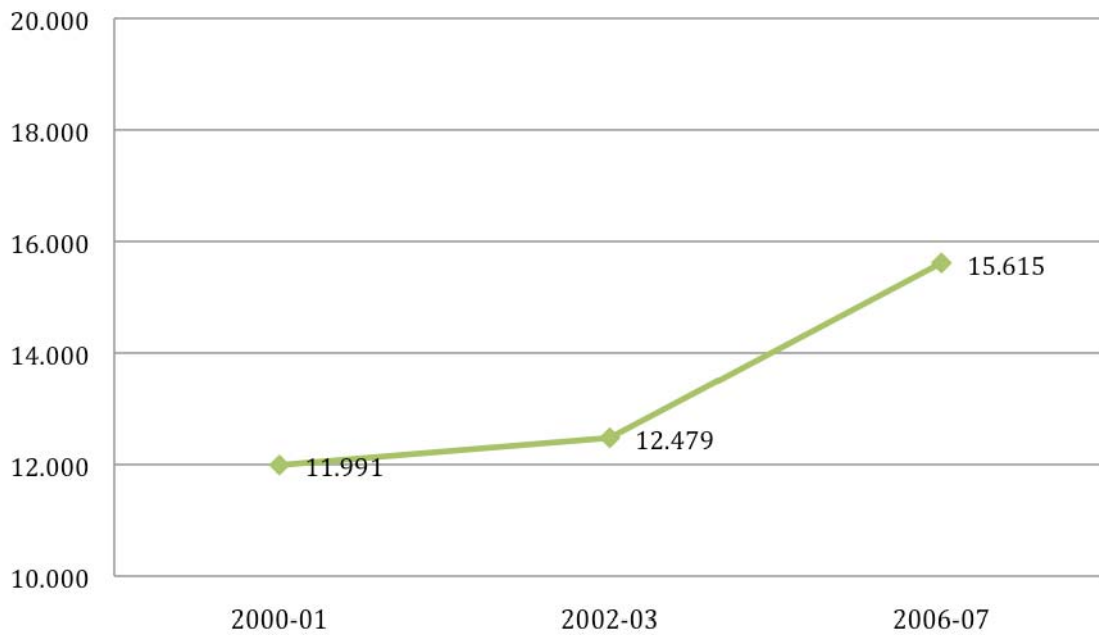


Source: Elaboration on CUDO data

The number of instructional faculty members in 2006 was equal to 15,615, and were predominately located in the Toronto area. The number of professors increased by more than 30% in six years. As before, the double cohort may have affected this data. More than 80% of all professors have a high level degree (Master and PhD). According to the faculty population and their skills, the universities, which host the most educated professors, are Waterloo (91.4%), Ottawa (90.9%) and London (90.7%). Relative to these others, The Universities in Toronto surprisingly do not boast highly educated faculties when viewed through the lens of graduate degrees held. At the University of Toronto only 54% of professors have a graduate degree; this percentage falls down in regards to York (32%) and Ryerson (13%). Since one of the most important elements in order to compete and succeed against other universities is the reputation of the faculty; Toronto's Universities should consider the level of education of their professors.

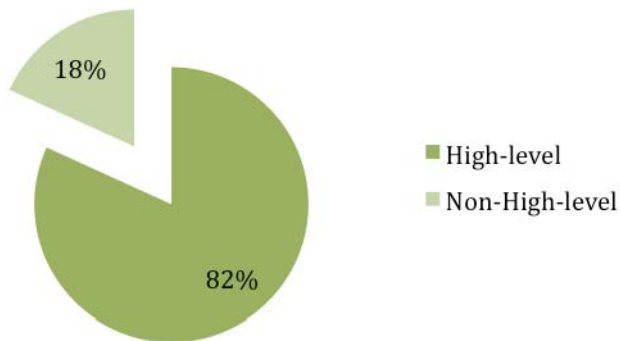
The other elements, which according to Roger Martin, Dean of the Rotman School of Management, are the strengths of a school like Rotman and in general of all the schools and universities, are their location, both in regards to the city and the area inside the city, the buildings, the relationship with other institutions and the dedication to innovation (Interview notes, 17th April, 2008).

Graph 10- Full-time faculty. Trends: 2000-01, 2002-03, 2006-07



Source: Elaboration on CUDO data

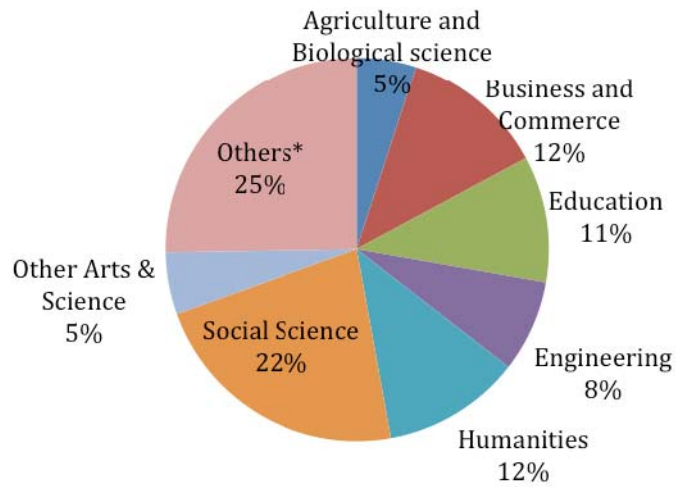
Graph.11-Percentage of faculty members by level of degree



Source: Elaboration on CUDO data

With regards to the university programs, the most popular are those in Social Sciences (22%), Business and Commerce (12%), Humanities (12%) and Education (11%).

Graph.12-Percentage of degrees by programs (2006-2007)

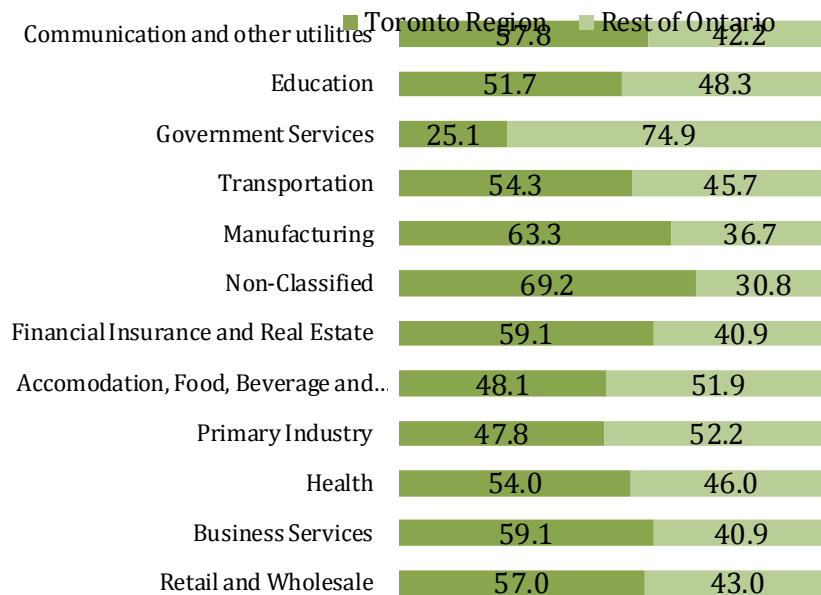


Source: Elaboration on CUDO data, 2007

Note: "Others" includes: Architecture (0.5), Computer Science (3.0), Dentistry (0.2), Food and Science nutrition (0.4), Forestry (0.1), Journalism (0.4), Kinesiology, Recreation & Physical Education. (3.0), Law (2.0), Mathematics (1.0), Medicine and Related Programs (2.3), Nursing (3.1), Optometry (0.1), Other Health Professions (0.8), Pharmacy (0.2), Physical Science (1.4), Theology (2.4), Therapy & Rehabilitation (0.9) and Veterinary Medicine (0.2).

The CUDO data shows that both graduates from universities (86%) and colleges (88%) have a high rate of employment six months after graduation. If we compare the percentage of degrees by programs and employment rates, we can observe that the social sciences and the business areas are doing quite well, even if the employment rates are not excellent.

Graph.13- Percentage of the Workplaces by Major Industry Group 2007 located in Toronto Region and in the rest of the Province out of the total of workplaces in Ontario



Source: Elaboration on Environics Analytics, Business Profiles, 2007

I will now look at the Attraction/Retention side, analyzing the Brain Drain/Gain index and the correlation between universities and colleges and the metropolitan areas of Ontario.

One of the main reasons why people and in particular talented people decide to move somewhere else is related to the lack of opportunities that they perceive to have “at home”. In order to better observe the overall situation about the so called brain drain problem, which indicates the movement of highly-skilled people from their region of origin to another, I looked at the Brain Drain/Gain Index (BDBG), created by Richard Florida, Kevin Stolarick and Brian Knudsen. The intent of this index is to understand the flows of talented people. A region may be simultaneously be losing its degree holders but at the same time gaining talent from other regions. Therefore, the index computes the relative gain or drain of talent in a region progressing from students to degree holding workers. I wanted to understand the relationship between this index and regional growth. I took into consideration several variables, in order to calculate the regional growth: Patent Growth, Tech Pole, High Tech Share (HT), Population Growth, Employment Growth and Income Growth. The CMA/CAs examined were: Ottawa-Gatineau, Kingston, Peterborough, Oshawa, Toronto, Hamilton, St.Catharines-Niagara, Kitchener, Brantford, Guelph, London, Chatham-Kent, Windsor, Barrie, Great Sudbury, Thunder Bay and Winnipeg.

The correlations are always positive and are very strong in the case of patent growth, HT share and income growth indicators; the correlations are less strong

in the case of population and employment growth. As stated by Florida, Stolarick and Knudsen, these kinds of correlations might reflect a “virtuous circle”: higher levels of talent lead to more technology generation; thus higher rates of economic growth lead to more job generation which leads again to more production of talent.

To conclude the section on talent, I analyze the relationship between the “generators” of this talent- Universities and Colleges- and Metropolitan Areas’ overall talent base. In this case I analyzed 13 CMAs: Ottawa-Gatineau, Kingston, Peterborough, Oshawa, Toronto, Hamilton, St.Catharines-Niagara, Kitchener, Guelph, London, Windsor, Great Sudbury and Thunder Bay. I ran a number of correlations examining the relationship between students, professors, the Creative Class and the talent index using data from CUDO survey and the Martin Prosperity Institute. What I found is that there is always a positive correlation between both students and faculty and regional talent and the presence of people on the territory who belong to the Super Creative Core. The most significant results are related to the correlation between students and faculty and the Creative Class.

As has been already stated, students could be defined as potentially part of the Creative Class. Students can be attracted to universities and colleges thanks to the presence of other students, the good image of those institutions, cutting edge programs and high level faculty. Besides, these reasons there are also determinants which are related to the wider metropolitan area. This issue is problematic because it provokes a circular logic issue. The presence of graduates from universities and colleges could influence the development of certain kinds of professions; however, at the same time, the fact that an area specializing in a certain economic sector may attract those students who want to dedicate themselves to a particular career path. Probably, the presence of what it is called path dependency could positively influence the development of a higher education specialization in some market sectors. However, at the same time the educational offer could positively influence the fact that a certain area focused its economic sector according to the value of its colleges and universities.

In this case we can also understand how the relationship and the mutual influence between higher education institutions and industry is one of the main factors of generation of innovation. Ontario has a good offer and produces a high numbers of graduates. The relationship between the BDBG index and patent growth, HT share and income growth indicators indicates that the relationship between higher education institutions and industry is fairly strong. However, the data do not show a large effect on the population and more important, employment growth. Nevertheless, the correlation between the presence of students and faculty and the presence of workers belonging to the Creative Class is significant.

5. Tolerance

The word “tolerance” can be misleading and for this reason it is necessary to provide a very brief definition of this term. Tolerance is usually used to indicate a static kind of behaviour, implying a passive acceptance of something or someone. Tolerance as we use it has a more active connotation. First of all, it implies several kinds of diversity, such as gender, racial, sexual orientation and disabilities. Secondly, it refers to dynamic dimensions, including integration, inclusiveness and accessibility.

I am going to discuss Tolerance in post secondary institutions of Ontario. Colleges and universities, in fact, with the presence of diversity and tolerance inside them, could strongly influence the creation of a tolerant, diverse and inclusive external environment. However, when campuses do not communicate and do not have a connection with the broader society, they could be only “islands of happiness”. Therefore, when these students complete their studies they will be willing to find another “island of happiness” and probably relocate.

I will discuss the Creation/Generation of diversity inside colleges and universities. As stated previously, “diversity” has a very broad meaning. Therefore the balance between male and female, the presence of foreigners both among students and faculty will be explored. Then we will investigate the tolerance issue, looking at the attention that Universities (we did not find data for colleges) pay to several topics among their clubs: interculturalism, disabilities, gender issues, human rights, religion, and sexual orientation. Finally, in order to explore the Attraction/Retention side I conducted statistical analyses to investigate the relationship between university and the wider regional tolerance.

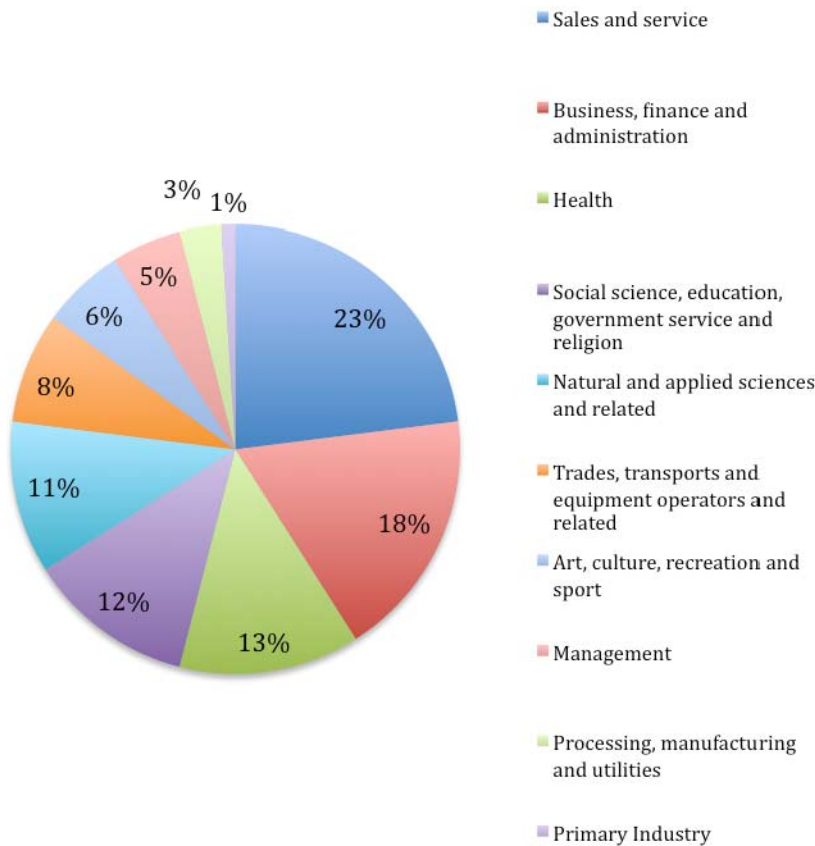
The post secondary institutions of Ontario provide significant data on their student data including sex, percentage of international students and other data.

Students enrolled in Ontario universities in 2006 are mainly female (55%) while college students had 54% female enrolments. International students constitute more than 7% of the total (4% male; 3% female). The universities, which show the highest average presence of international students among their enrolments, are Windsor (9%), Waterloo (9%) and Toronto (7%). Concerning the percentage of the total enrolment of the Ontario students, the most representative diverse compositions of enrolment are Toronto (40%), Ottawa (14%) and Waterloo (13%). If we compare the trends of the enrolment of the whole population of the students, we can notice that the increase of the international students is not only a consequence of the increment of the general enrolment; the percentage of the international students increased by 126% between 2000 and 2006. In this case the importance of treating and receiving these students well is even more essential, but more difficult. Universities and cities have to first of all understand what the needs of the newcomers are (which will be in some ways different from those of the Canadian students) and then satisfy them. We can also observe that the enrolment of international students in the Ontario colleges also increased.

The increment is even higher than that of the universities; it is equal to 124% between 2000 and 2006. This data is very relevant because if we compare the relative increment in the enrolment of the international students with that of the enrolments as a whole; we observe that unlike the case of the universities, while this data is positive in the first case, in the second case it is negative. The total enrolments of students in the Ontario colleges had a slight increase of 0.5% in 2006 and a decrease of 0.6% in 2007.

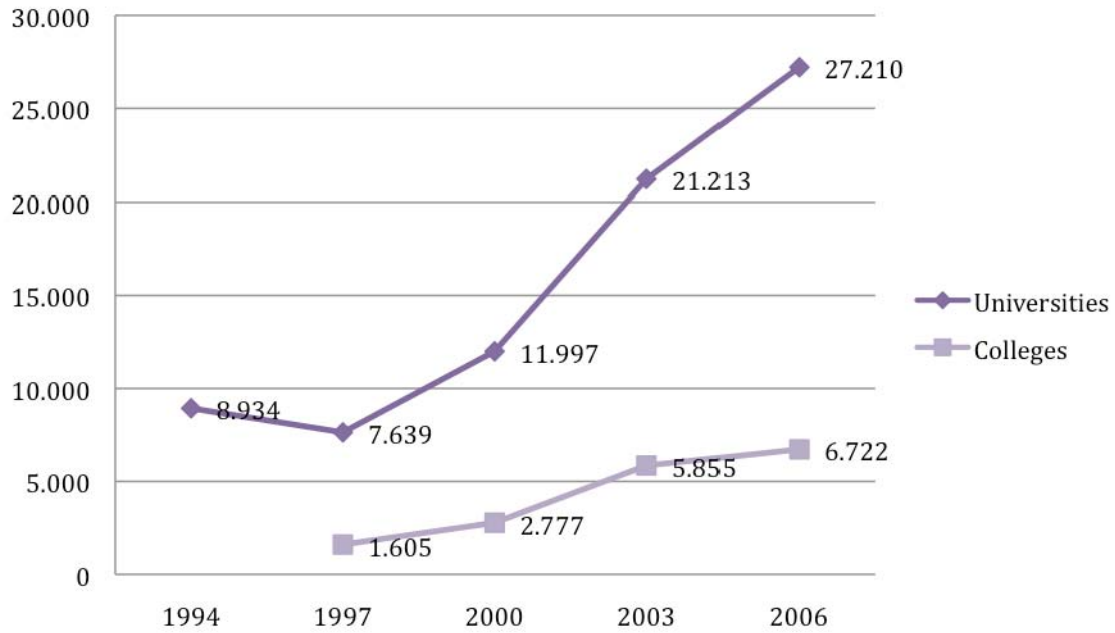
According to the Environmental Scan Report, produced in 2008 by colleges in Ontario, 69% of the students enrolled in colleges are foreign born in the central region of Ontario. Furthermore, the business programs seem to be the most attractive with 57% of the international students choosing these courses (21% arts, 19% technology, and 3% health).

Graph.14-College Graduates by Employment Sector, 2005-2006



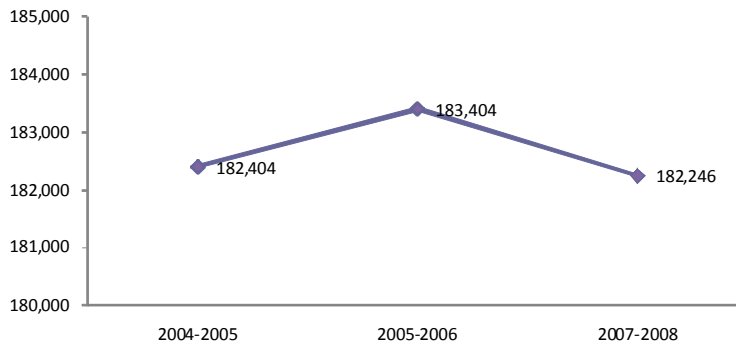
Source: Elaboration on Environmental Scan

Graph.15- International full-time student enrollment. Trends 1994-2006



Source: Elaboration on Environmental Scan 2008 Colleges Ontario

Graph.16- Enrollment of Students, trends 2004-2008

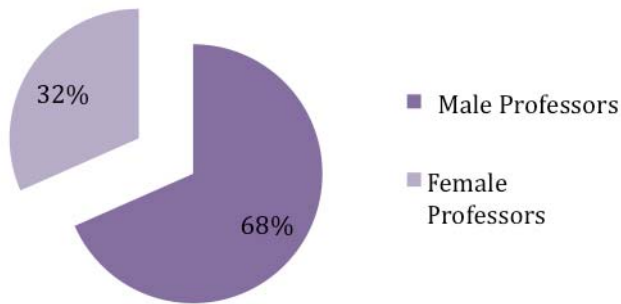


Source: Elaboration on Environmental Scan 2008 Colleges Ontario

Therefore, it is possible to approximate a total presence of international students who attend the post secondary institutions in Ontario at about 35,000 students.

The gender issue is still relevant. If we analyze the composition of the faculty in Ontario universities we observe that women only make up 32% of all faculty members. At Nipissing University and Brock University the rate goes over 40%, but the situations at the University of Toronto and The University of Waterloo is quite critical (29%).

Graph.17- Professors by Gender (%)

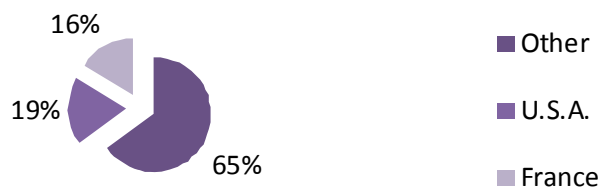


Source: Elaboration on CUDO data, 2006

Concerning the composition of the faculties in terms of foreign professors I can show only a few cases due to the lack of data in this area. For this reason it is impossible to give a general overview of the Ontario situation, so we have to limit our discussion to individual universities, in particular: Brock University in St. Catharines, Laurentian University in Sudbury, University of Toronto and the University of Waterloo.

Brock University hosts a total of 20 foreigners among professors, scholars and mentors who are visiting. Several countries are represented; the most represented are France, China and Korea. Laurentian University counts 37 foreign full time professors, mainly from the U.S. and France.

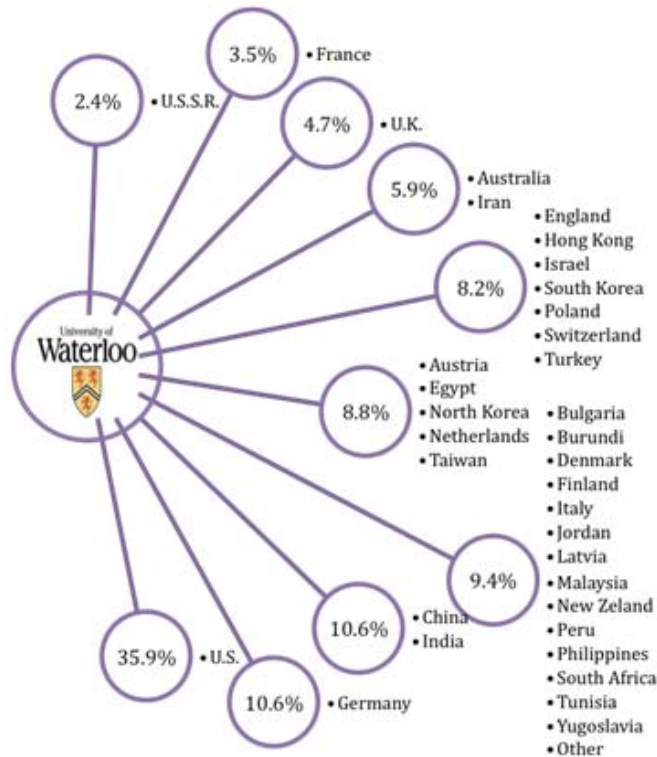
Graph.18 Number of full-time faculty at Laurentian University by country of citizenship



Source: Laurentian University, 2008

The University of Toronto provides data about the new hires from July 1, 2006 to June 30, 2007. It is interesting to observe that the percentage of new hires that do not have Canadian citizenship is very close to that of the hires who have Canadian citizenship (43% non Canadians). Foreign professors (107 professors in total) compose 21% of the faculty of the University of Waterloo.

Figure.2- Foreign Professors at the University of Waterloo



Source: University of Waterloo, 2008

Concerning Tolerance within the University environment it seemed useful to take into consideration the presence of centres, associations and clubs concerned with:

- Interculturalism
- Students with disabilities
- Gender issues
- Human Rights
- Religion
- Sexual Orientation

All the universities report information about student life on their websites, and all of them provide support for the satisfaction and expression of needs and issues of diversity.

In general, many Universities provide an office dedicated to the observance and the respect of diversity among students. These offices take into account all the aspects, which have been listed above. For example, the Office for Student Diversity at the Laurier University in Waterloo is concerned with offering a welcoming and open minded environment for all types of diversity: culture, age, gender, gender expression, race, ethnicity, national origin, physical ability, sexual orientation, and religious affiliation. In the same way, the OCAD Student Union in Toronto is a non-profit corporation, which represents the OCAD student body at large. They promote several kinds of cultural and recreational activities to enrich the social life of the students while avoiding discrimination in its broadest sense. They provide several services, such as: academic and political advocacy, grants, ISIC cards, legal services, publications, student group support and XPACE, which is a non-profit centre run by artists and students. The centre also tries to get exposure for the emerging artists at the local and international level. We are going to analyze the different categories listed above, reporting some good examples among the Ontario universities.

1. Interculturalism

The University of Guelph is particularly focused on the aspects related to the support of cultural integration of students. The Office for Intercultural Affairs hosts several centers, with programs mainly focused on providing services and facilities to the students belonging to a minority. For example, there is the Aboriginal Resource Centre, the International Students Advisor and the Intercultural Programming. The objective of these organizations is to facilitate academic excellence of the Aboriginal and foreign students, giving them economic, psychological and social support. The clubs have a central role in fostering cultural diversity as well. The University of Waterloo has 160 clubs, among which there are 13 clubs mainly focused on intercultural issues, such as the African Students Association, the Association of Caribbean Students, the Chinese Students Association, the Latin America Students Association and many others. Ryerson University in Toronto has more than 30 clubs for cultural differences among students. There are, for example, the Arab Students Association, the Iraqi Students Association, the Polish Students Association (IMPREZA) and so on.

2. Students with disabilities

Queen's University in Kingston offers a Disability Service. It assists disabled students in different ways: facilitating access to information, providing services, such as note taking, peer mentoring and adaptive technology, space, activities and a reasonable accommodation.

The Centre for Students with Disabilities at the University of Ontario Institute of Technology in Oshawa helps students who have vision and hearing problems, or who have a physical, medical, psychiatric or learning disabilities. Their website is very well organized and clearly shows all the opportunities that these students have. They offer, for example, a Summer Transition Program, which assists students with comprehension, learning and communication problems. Moreover, several types of assistive software, such as memory and organizational tools, are downloadable for free on their website.

3. Gender issues

The Equity Issue website of the University of Toronto offers enormous amounts of information about the respect of any kind of differences inside the campus. In particular, the Status of Women Office is addressed to the inequities which women staff, faculty and students at the U of T experience. They provide assistance, information, education, and they organize events and mentoring programs.

The University of Ottawa does not host any centre focused on gender issues, but on the website of the Student Confederation it is possible to find the associations run by the students which are concerned with women's condition: Women's Studies Student Association and Radical Feminism Collective.

Particularly interesting is the Trent Women's Centre in Peterborough. It is student run and provides support not only for the women from Trent University but also for the surrounding community. Their space is at the Sadleir House Alternative Resource Library, where it is possible to find books, movies and documents on women's history and feminism. They offer employment opportunities, counselling and free safer sex supplies. They are also connected with the other Ontario University and College Women Centres, which are: Cambrian Women's Centre, Carleton Women's Centre, Women's Centre at Durham College, UOIT and Trent University, Women's Centre at George Brown College, Guelph Resource Centre for Gender Empowerment and Diversity, Gender Issues Centre at Lakehead University, Women's Centre at Laurentian University, Nipissing University Women's Centre at the Nipissing University, Women's Resource Centre at the University of Ottawa, Ryerson Women's Centre at the Ryerson University, The Centre for Women and Trans People at the University of Toronto, Women's Centre @ UTSC at the University of Toronto at Scarborough, Trent Women's Centre at Trent University, Women's Issues Network at the University of Western Ontario, Women's Centre at Wilfred Laurier University, Centre for Women and Trans People at York University.

4. Human Rights

The University of Windsor has created the Human Rights Office to foster an equal environment, which is free from every kind of harassment or discrimination. They provide a Human Rights Commissioner in order to deal with the cases of violation of human rights. They investigate complaints, conduct educational programs, and organize workshops and events in order to increase awareness towards the respect of diversity. On their website they provide good information about the Ontario Human Rights Code and they try to define what discrimination and harassment are for visitors. They also have a section dedicated to references on this topic and all the titles are available at their office. A very interesting section is the Annual Report (which dates back to 2003). Since it reported from the period May 1, 2002 to April 30, 2003, the Office opened 79 complaint files. The harassments were based on personal and workplace issues; sex (mainly), sexual orientation, race, color, disability and religion. The discrimination reports were based on gender, race (mainly), color, disability, religion and age. To conclude this brief presentation of the Human Rights Office at the University of Windsor I am going to highlight the presence of the Employment Equity Office which is focused on the hiring and training of four groups of people: women, visible minorities, Aboriginal people and people with disabilities.

Concerning clubs we can report the Human Rights Society at Carleton University. They try to develop the awareness of students (and not only) on this topic, organize fundraising, conduct actions, and organize social events.

The University of Ottawa shows in its website a list of the humanitarian clubs which are present at the university: Amnesty International, Engineers without borders, the University of Ottawa UNICEF club, Dominican Heroes, Life-Lines Canada, The Abhilasha Project, The Elimu Project.

5. Religion

Queen's University provides a complete list of the clubs which have a religious orientation. Christianity, Catholicism, Islam and Buddhism are represented.

Trent University hosts: the Trent Christian Fellowship, Trent Jewish Association, Trent Muslims Students' Association and Trent Pagan Circle.

The University of Toronto has more than thirty clubs in its list with a religious purpose. Many religions are represented even if the clubs are in majority Catholic and Christian.

6. Sexual-Orientation

The Federation of Students at the University of Waterloo, which offers several services such as Campus Responses Team, the Feds Food Bank Initiative, the International Students Connection, the Sustainability Project, the Women's Centre and also the GLOW, the Queer and Questioning Community Centre. The Centre provides discussion groups which are divided in three main areas of interest: coming-out, heart-to-heart and diversity; they have a section dedicated in particular to women, called Dyketopia; they provide a phone line support and also a library for any kind of information about the topic of interest. They also organize social events and provide any kind of support to people who feel confused and isolated because of their sexual orientation. The web site is very well organized and constantly updated.

Lakehead University offers a centre called Pride Central, which supports people who are affected by intolerance because of their sexual orientation. The centre is dedicated not only to students but also to the faculty and people who work at the university. They provide information through the resources available at their library and the organization of workshops, seminars and discussion groups. However, the website dates up to 2006-2007.

Many Ontario universities count clubs, which are focused on sexual orientation issues; the University of Toronto for example lists the Lesbians, Gays, Bisexuals and Trans People of the U of T and The U of T Outing Club.

All these elements can contribute to the achievement of a satisfying quality of life, which would be sustainable from different points of view. Government (and citizens), Enterprises and Universities can work together -or even better, should work together to build a pleasant place to live in, a safe and healthy environment, and together providing a strong sense of community. "The achievement of more sustainable places depends, increasingly, on a systemic approach in which creativity and R&D can shape innovative and successful ways to communicate and implement sustainable solutions" (Anzoise, forthcoming).

With regards to this aim, I am now going to look at the data about the correlation between the data from the higher education institutions and the general melting pot and tolerance indexes calculated for the metropolitan areas of Ontario.

As I did for technology and talent, also in this case I conducted statistical analyses in order to study the relationship between the university and the regional tolerance (13 CMAs were taken into consideration as in the Talent-case). The indexes I used in order to define the concept of Tolerance were: Mosaic, Gay/Lesbian, Bohemian and Integration Indexes. I found a positive correlation between the log of the students and the population and these values. The

correlation is particularly high in Mosaic, Gay/Lesbian and Bohemian indexes cases. Differences between the students and the overall population can be found in the case of the Mosaic, Gay/Lesbian and Bohemian indexes where the population showed a higher level of correlation, however, in the Integration index case students showed a higher level of correlation. Based on these results, it would be possible to say that universities and colleges have a large effect on integration.

6. Conclusions

In this paper I gave a general overview of the higher education situation in Ontario. The element of novelty in the evaluation of the quality and the excellence of colleges and universities is represented in the use of the 3Ts approach. A traditional approach, which would take into account only data about Research & Developments success, seems reductive. The Creation of Technology is not sufficient to declare that a university or a college is cutting-edge. This traditional view based on scientific results is totally detached from a perspective, which was inclusive and comprehensive of other qualitative aspects that are very important for the evaluation oriented to a future vision as well.

The number of students or patents cannot delineate the connection between higher education institutions and the metropolitan area. An approach like this completely ignores the huge role that the city recovers in the students' choices: first of all in their decision about where to study, and then where to work. In my personal research, for example, I found that people who chose to attend a Master in Business Administration (MBA) selected the city where they would like to live in before evaluating the ranking of the MBA schools. Then, if in that particular city an MBA programme was present, they started to look at the quality of the school (Sedini, forthcoming).

Colleges and universities could be seen as microcosms of the local community because inside them a considerable part of human activities takes place (Anzoise, forthcoming). A vibrant local community could influence and be influenced by a vibrant campus. As Richard Florida (2002) clearly explained in *The Rise of the Creative Class*, cases like Pittsburgh are significant in understanding why an excellent research centre is not enough to declare the success of a metropolitan area. According to this observation, I looked at Ontario's higher education from two main perspectives: Creation/Generation (which could be defined as the more traditional one) and Attraction/Retention.

As I stated before, only the production of knowledge, graduates and opportunities by the colleges and universities is not sufficient if it is not linked to the broader presence of an innovative, cultural, diverse and accessible environment in the metropolitan area. Therefore, institutions of higher education can constitute a good starting point and reciprocally influence the urban environment in which

they are located. Technology, Talent and Tolerance are the three main dimensions I took into account in order to analyze Ontario's situation.

The correlation between the production of the universities and colleges and the mega region overall using the 3Ts is always positive and in some cases highly significant. For example, in the Technology case the relationship between the invention disclosures and the patent applications made by the universities and the Tech Pole and the patents count inside the mega region is considerable. The presence of talented people, such as students and professors, has a positive and very strong correlation with the presence of Creative Class inside the territory as well. Also in the Tolerance case I found a positive and significant relationship between the presence of students and the general overall level of integration inside the Ontario Province.

Future and more in depth research should look closely at the universities and colleges as *creative hubs*, which are at the core of the development of the Metropolitan Areas. A reciprocal and positive influence between higher education institutions and the territory where they are located could be reachable thanks to the collaboration and the mutual knowledge between the two actors. Metropolitan Areas could be innovative and improve the quality of life of their old and new citizens by working together with higher education institutions and developing their shared capabilities in building and retaining Technology, Talent and Tolerance.

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Appendix

User Note: this analysis was conducted by a researcher from the EU and notation for decimals will often be indicated by a comma as per their local conventions.

Table.1- Benchmark of the public funded Universities in Ontario

	City	Name
1	Guelph	University of Guelph
2	Hamilton	McMaster University
3	Kingston	Queen's University
4	London	University of Western Ontario
5	London	Brescia University College
6	London	Huron University College
7	London	King's University College
8	North Bay	Nipissing University
9	Oshawa	University of Ontario Institute of Technology
10	Ottawa	University of Ottawa
11	Ottawa	Carleton University
12	Peterborough	Trent University
13	St. Catharines	Brock University
14	Sudbury	Laurentian University
15	Thunder Bay	Lakehead University
16	Toronto	Ryerson University
17	Toronto	University of Guelph-Humber
18	Toronto	University of Toronto
19	Toronto	York University
20	Toronto	Ontario College of Art & Design
21	Waterloo	University of Waterloo
22	Waterloo	Wilfrid Laurier University
23	Windsor	University of Windsor

Source: Ministry of Training, Colleges and Universities. Ontario Government, 2008

Table.2- Benchmark of the public funded Colleges in Ontario

	City	Name
1	Barrie	Georgian College of Applied Arts and Technology
2	Belleville	Loyalist College of Applied Arts and Technology
3	Hamilton	Mohawk College of Applied Arts and Technology
4	Kingston	St. Lawrence College of Applied Arts and Technology
5	Kitchener	Conestoga College Institute of Technology and Advanced Learning
6	London	Fanshawe College of Applied Arts and Technology
7	Nepean	Algonquin College of Applied Arts and Technology
8	North Bay	Canadore College of Applied Arts and Technology
9	North York	Seneca College of Applied Arts and Technology

10	Oakville	Sheridan College Institute of Technology and Advanced Learning
11	Oshawa	Durham College of Applied Arts and Technology
12	Ottawa	La Cité collégiale
13	Peterborough	Fleming College
14	Sarnia	Lambton College of Applied Arts and Technology
15	Sault Ste. Marie	Sault College of Applied Arts and Technology
16	Sudbury	Cambrian College of Applied Arts and Technology
17	Sudbury	Collège Boréal
18	Thunder Bay	Confederation College of Applied Arts and Technology
19	Timmins	Northern College of Applied Arts and Technology
20	Toronto	Centennial College
21	Toronto	George Brown College of Applied Arts and Technology
22	Toronto	Humber College Institute of Technology and Advanced Learning
23	Welland	Niagara College of Applied Arts and Technology
24	Windsor	St. Clair College of Applied Arts and Technology

Source: Ministry of Training, Colleges and Universities. Ontario Government, 2008

Table.3- Funding in Social Science and Humanities in 2006-2007

	Social Sciences and Humanities
Toronto Un.	\$39,195,646.50
Waterloo Un.	\$26,452,335.00
Ottawa Un.	\$14,729,865.50
London Un.	\$7,919,401.00
Queen's	\$7,078,562.00
McMaster	\$6,829,521.00
Guelph	\$3,001,361.00
Windsor	\$1,424,639.00
Brock	\$1,355,049.00
Trent	\$1,062,953
Lakehead	\$675,469.00
Laurentian	\$248,022
Nipissing	\$127,886.00
UOIT	\$114,351.00
Total	\$ 88,540,800.50

Source: Elaboration on CUDO survey, 2006

Table.4- Funding in Natural Science and Engineering

	Natural Science and Engineering
Toronto Un.	\$113,460,667.00
Waterloo Un.	\$68,204,268.00
Ottawa Un.	\$29,905,771.00
Queen's	\$24,204,666.00
McMaster	\$23,960,475.00
Guelph	\$23,099,150.00
London Un.	\$16,739,000.00
Windsor	\$7,112,087.00
Laurentian	\$2,995,038
Brock	\$2,977,059.00
Trent	\$2,924,732
Lakehead	\$2,808,610.00
UOIT	\$1,085,036.00
Nipissing	\$183,693.00
Total	\$256,440,082.00

Source: Elaboration on CUDO survey, 2006

Table.5- Funding in Health Research in 2006-2007

	Canadian Institutes of Health Research
Toronto Un.	\$159,050,319.00
Waterloo Un.	\$152,657,548.00
McMaster	\$34,719,530.00
Ottawa Un.	\$29,635,255.00
London Un.	\$28,404,311.00
Queen's	\$18,106,196.00
Guelph	\$5,858,486.00
Lakehead	\$720,007.00
Brock	\$393,321.00
Windsor	\$307,989.00
Laurentian	\$283,200
UOIT	\$23,502.00
Trent	0
Nipissing	0
Total	\$421,748,494.00

Source: Elaboration on CUDO survey, 2006

Table.6- Canada's ICT Top Corporate R&D Spenders, 2005 Fiscal Year

Company	R&D Expenditures (Cnd\$ million)
Nortel Networks Corporation	2,248.7
Bell Canada	1,740.0
IBM Canada Ltd. (fs)	343.0
Ericsson Canada Inc. (fs)	201.0
Alcatel Canada Inc. (fs)	194.0
Cognos Incorporated*	128.4
Motorola Canada Limited (fs)	51.0

Source: RESEARCH Infosource Inc., Canada's Top 100 Corporate R&D List, 2006 (2/2007)

Table.7- Number of degree seeking students (headcount) enrolled for Fall 2006

University	Students	% stud. out of the pop
Guelph	21,656	17.1
McMaster	24,265	3.5
Queen's	18,249	12.0
London Un.	48,079	10.5
Nipissing	5,177	8.2
UOIT	4,299	1.3
Ottawa Un.	53,512	4.7
Trent	8,311	5.5
Brock	17,145	4.4
Laurentian	8,726	5.5
Lakehead	7,342	6.0
Toronto Un.	149,514	2.9
Waterloo Un.	41,253	9.9
Windsor	16,792	5.2
Total	424,320	

Source: Elaboration on CUDO survey, 2006

Table.8- Correlations between University and Regional Technology Measures

	Licensing Income	Invention Disclosures	Patent Applications	Start-ups
Tech Pole	0,241	0,897	0,673	0,313
Patents count	0,233	0,888	0,658	0,305

Source: Elaboration on MPI (2008) and CUDO (2006) data

Table.9- Number of graduates by college, 2005-2006.

City	College	
Nepean	Algonquin College of Applied Arts and Technology	4861
Sudbury	Cambrian College of Applied Arts and Technology	1569
North Bay	Canadore College of Applied Arts and Technology	1262
Toronto	Centennial College	3331
Sudbury	Collège Boréal	540
Kitchener	Conestoga College Institute of Technology and Advanced Learning	1966
Thunder Bay	Confederation College of Applied Arts and Technology	1146
Oshawa	Durham College of Applied Arts and Technology	2043
London	Fanshawe College of Applied Arts and Technology	4452
Peterborough	Fleming College	2453
Toronto	George Brown College of Applied Arts and Technology	4464
Barrie	Georgian College of Applied Arts and Technology	2270
Toronto	Humber College Institute of Technology and Advanced Learning	4464
Ottawa	La Cité collégiale	979
Sarnia	Lambton College of Applied Arts and Technology	781
Belleville	Loyalist College of Applied Arts and Technology	1159
Hamilton	Mohawk College of Applied Arts and Technology	3394
Welland	Niagara College of Applied Arts and Technology	2579
Timmins	Northern College of Applied Arts and Technology	570
Sault Ste. Marie	Sault College of Applied Arts and Technology	715
North York	Seneca College of Applied Arts and Technology	5435
Oakville	Sheridan College Institute of Technology and Advanced Learning	4278
Windsor	St. Clair College of Applied Arts and Technology	2378
Kingston	St. Lawrence College of Applied Arts and Technology	1941
Total		59029

Source: MTCU 2006

Table. 10- Number awarded in calendar year 2006

	UND. CERTIFICATE	UND. DIPLOMA	BACH. DEGREE	II entry PROF. DEGREE	MASTER	DOCTORATE	TOT.
Guelph			3,230	105	556	108	3,999
McMaster	10	1	4,102	166	714	150	5,143
Queen's	34	27	3,304	840	855	150	5,210
London Un.	48	45	4,754	1,156	1,338	192	7,533
Nipissing	19	44	676	714	66	0	1,519
UOIT				90			90
Ottawa Un.	130	6	7,852	1,673	1,836	220	11,717
Trent		7	1,389	355	48	8	1,807

Brock		118	1,389	2,529	353	7	4,396
Laurentian	42	4	1,410	190	160	0	1,806
Lakehead	81	61	1,605	409	145	5	2,306
Toronto Un.	1,800	100	20,831	2,799	4,996	801	31,327
Waterloo Un.	0	116	6,405	75	1,242	167	8,005
Windsor	45	44	2,431	972	422	39	3,953
Total	2209	573	59378	12073	12731	1847	88811

Source: Elaboration on CUDO survey, 2006

Table.11- Number of instructional faculty members (Fall 2006)

	Total Faculty	Faculty with high-level degree (%)
Guelph	795	98.9
McMaster	843	91.3
Queen's	832	97.8
London Un.	1247	90.7
Nipissing	143	71.3
UOIT	90	100.0
Ottawa Un.	1882	90.9
Trent	266	90.6
Brock	565	85.8
Laurentian	401	80.8
Lakehead	290	84.8
Toronto Un.	6331	68.6
Waterloo Un.	1414	91.4
Windsor	516	85.5
Total	15615	81.8

Source: Elaboration on CUDO survey, 2006

Table. 12- Number of degrees by programs (2006-2007)*

	Guelph	McMaster	Queen's	London Un.	Nipissing	Ottawa Un.	Trent	Brock	Laurentian	Lakehead	Toronto Un.	Waterloo Un.	Windsor	ON
Agriculture & Biological science	810	405	576	416	20	378	121	67	96	99	1004	251	88	4331
Architecture	49	0	0	0	0	85	0	0	0	0	209	90	0	433
Business & Commerce	472	621	386	1013	59	1006	131	483	251	125	4437	939	554	10477
Computer Science	89	47	106	184	3	266	37	58	30	11	1058	543	148	2580
Dentistry	0	0	0	71	0	0	0	0	0	0	100	0	0	171

Education	0	0	760	69	830	1299	355	896	213	623	3242	0	834	9121
Engineering	167	674	717	447	0	1188	0	0	18	226	1866	1061	280	6644
Fine & Applied Arts	130	97	154	195	18	209	56	93	22	22	2029	163	163	3351
Food Science & Nutrition	216	0	0	11	0	0	0	0	0	0	118	0	0	345
Forestry	0	0	0	0	0	0	0	0	0	33	26	0	0	59
Humanities	431	710	534	862	160	1204	360	495	233	218	3392	1078	321	9998
Journalism	0	0	0	39	0	127	0	0	0	0	175	0	0	341
Kinesiology, Recreation & Phys. Educ.	157	203	82	327	0	233	0	480	91	104	468	331	154	2630
Law	0	0	163	155	0	643	0	0	0	0	620	7	177	1765
Mathematics	35	128	55	131	4	251	16	33	10	27	440	617	31	1778
Medicine and Related Programs	13	354	156	669	0	205	0	0	0	0	632	0	0	2029
Nursing	0	272	113	176	22	323	65	63	75	137	1239	0	151	2636
Optometry	0	0	0	0	0	0	0	0	0	0	0	75	0	75
Other Arts & Science	163	156	0	930	58	1477	4	78	45	66	902	475	97	4451
Other Health Professions	0	13	14	16	0	28	0	102	14	19	405	99	8	718
Pharmacy	0	0	0	0	0	0	0	0	0	0	197	0	0	197
Physical Science	70	100	106	126	0	133	40	22	41	25	336	147	44	1190
Social Science	1042	1213	1021	1058	282	2459	615	754	621	425	6900	2038	857	19285
Theology	155	25	12	0	0	57	0	0	1678	0	161	18	0	2106
Therapy & Rehabilitation	0	105	193	148	0	113	0	0	82	0	169	0	0	810
Veterinary Medicine	0	0	0	0	0	0	0	0	0	0	0	0	0	155
TOTAL: DOMESTIC DEGREES CONFERRED	3847	4692	4981	6607	1433	10805	1644	3390		1090	28031		3635	70155
TOTAL: INTERNATIONAL DEGREES CONFERRED	152	440	168	436	23	776	107	234		74	2094		273	4777
TOTAL	3999	5132	5149	7043	1456	11581	1751	3624	3520	1164	30125	7932	3908	86384

Source: Elaboration on CUDO data (2005)

*UOIT is missing

Table.13- Workplaces by Major Industry Group 2007 in Ontario

Workplaces by Major Industry Group 2007	Total	Percent
Retail and Wholesale	154,947	28.40%
Business Services	104,735	19.20%
Health	49,157	9.00%
Primary Industries	47,110	8.60%
Accommodation, Food, Beverage and Recreation	46,712	8.60%
Financial, Insurance and Real Estate	35,300	6.50%
Non-Classified	33,199	6.10%

Manufacturing	26,964	4.90%
Transportation	17,196	3.20%
Government Services	14,104	2.60%
Education	12,198	2.20%
Communication and Other Utilities	3,263	0.60%
Total	544,885	100.00%

Source: Elaboration on Environics Analytics, Business Profiles, 2007

Table.14- Workplaces by Key Science & Tech Industries 2007 in Ontario

Workplaces by Key Science & Tech Industries 2007	Total	Percent
Health and Medical Services	35,673	28.90%
Professional, Scientific and Technical Services	34,487	27.90%
Information Services and Data Processing	15,467	12.50%
Finance and Insurance	13,644	11.00%
Publishing & Printing	5,319	4.30%
Primary and Fabricated Metals Mfg	3,898	3.20%
Computer & Electronic Products & Appliances Mfg	3,558	2.90%
Machinery Mfg	2,642	2.10%
Broadcasting and Telecommunications Services	2,384	1.90%
Motion Picture Production/Distribution (excluding theatres)	1,325	1.10%
Post Secondary Education Facilities	928	0.80%
Plastics & Rubber Mfg	838	0.70%
Wholesale Motor Vehicles & Parts	883	0.70%
Non-metallic Mineral Products Mfg	681	0.60%
Basic and Other Chemicals Mfg	606	0.50%
Transportation Equipment Mfg	667	0.50%
Medical Devices & Instruments Mfg	232	0.20%
Measuring, Other Instruments (Non-medical) Mfg	280	0.20%
Petroleum Mfg	63	0.10%
Pharmaceuticals Mfg	53	0.00%
Total of Selected Industries	123,628	100.00%

Source: Elaboration on Environics Analytics, Business Profiles, 2007

Table.15- Workplaces by Major Industry Group 2007 in Toronto Region
(includes Durham, Guelph, Halton, Hamilton, Peel, Toronto, Waterloo, Wellington and York)

Workplaces by Major Industry Group 2007 in Toronto	Total	Percent
Retail and Wholesale	88,293	29.10%
Business Services	61,854	20.40%
Health	26,529	8.70%
Non-Classified	22,965	7.60%
Primary Industries	22,500	7.40%
Accommodation, Food, Beverage and Recreation	22,450	7.40%
Financial, Insurance and Real Estate	20,852	6.90%
Manufacturing	17,063	5.60%
Transportation	9,336	3.10%
Education	6,310	2.10%
Government Services	3,536	1.20%
Communication and Other Utilities	1,885	0.60%
Total	303,573	100.00%

Source: Elaboration on Environics Analytics, Business Profiles, 2007

Table.16- Workplaces by Key Science & Tech Industries 2007 in Toronto Region
(includes Durham, Guelph, Halton, Hamilton, Peel, Toronto, Waterloo, Wellington and York)

Workplaces by Key Science & Tech Industries 2007	Total	Percent
Professional, Scientific and Technical Services	22,333	29.20%
Health and Medical Services	20,047	26.20%
Information Services and Data Processing	9,847	12.90%
Finance and Insurance	8,506	11.10%
Publishing & Printing	3,662	4.80%
Primary and Fabricated Metals Mfg	2,395	3.10%
Computer & Electronic Products & Appliances Mfg	2,245	2.90%
Machinery Mfg	1,669	2.20%
Broadcasting and Telecommunications Services	1,429	1.90%
Motion Picture Production/Distribution (excluding theatres)	1,038	1.40%
Plastics & Rubber Mfg	588	0.80%
Wholesale Motor Vehicles & Parts	546	0.70%

Post Secondary Education Facilities	562	0.70%
Basic and Other Chemicals Mfg	415	0.50%
Non-metallic Mineral Products Mfg	405	0.50%
Transportation Equipment Mfg	318	0.40%
Medical Devices & Instruments Mfg	141	0.20%
Measuring, Other Instruments (Non-medical) Mfg	173	0.20%
Pharmaceuticals Mfg	44	0.10%
Petroleum Mfg	27	0.00%
Total of Selected Industries	76,390	100.00%

Source: Elaboration on Environics Analytics, Business Profiles, 2007

Table.17- Workplaces by Major Industry Group 2007 in CMA Toronto

Workplaces by Major Industry Group 2007 in Toronto	Total	Percent
Total	241,009	100.00%
Retail and Wholesale	70,338	29.20%
Business Services	50,332	20.90%
Health	20,150	8.40%
Non-Classified	20,052	8.30%
Accommodation, Food, Beverage and Recreation	17,103	7.10%
Financial, Insurance and Real Estate	16,684	6.90%
Primary Industries	16,333	6.80%
Manufacturing	13,520	5.60%
Transportation	7,658	3.20%
Education	4,889	2.00%
Government Services	2,388	1.00%
Communication and Other Utilities	1,562	0.60%

Source: Elaboration on Environics Analytics, Business Profiles, 2007

Table.18- Workplaces by Key Science & Tech Industries 2007 in CMA Toronto

Workplaces by Key Science & Tech Industries 2007	Total	Percent
Professional, Scientific and Technical Services	18,743	30.40%
Health and Medical Services	15,288	24.80%
Information Services and Data Processing	8,197	13.30%
Finance and Insurance	6,925	11.20%

Publishing & Printing	3,220	5.20%
Primary and Fabricated Metals Mfg	1,691	2.70%
Computer & Electronic Products & Appliances Mfg	1,641	2.70%
Machinery Mfg	1,223	2.00%
Broadcasting and Telecommunications Services	1,222	2.00%
Motion Picture Production/Distribution (excluding theatres)	937	1.50%
Plastics & Rubber Mfg	468	0.80%
Wholesale Motor Vehicles & Parts	418	0.70%
Post Secondary Education Facilities	462	0.70%
Basic and Other Chemicals Mfg	337	0.50%
Non-metallic Mineral Products Mfg	318	0.50%
Transportation Equipment Mfg	215	0.30%
Medical Devices & Instruments Mfg	115	0.20%
Measuring, Other Instruments (Non-medical) Mfg	125	0.20%
Pharmaceuticals Mfg	37	0.10%
Petroleum Mfg	20	0.00%
Total of Selected Industries	61,602	100.00%

Source: Elaboration on Environics Analytics, Business Profiles, 2007

Table.19- Employment Rates of 2004 Graduates in Undergraduate Programs

	E.R. after 2 years	E.R. after 6 months
Guelph	96.8	94.9
McMaster	95.7	95.1
Queen's	96.4	93.1
London Un.	96.2	93.6
Nipissing	98.0	92.7
UOIT	100.0	86.7
Ottawa Un.	95.8	90.1
Trent	93.8	94.3
Brock	87.5	94.0
Laurentian	96.6	97.1
Lakehead	95.1	91.4
Toronto Un.	96.5	90.6
Waterloo Un.	97.1	96.2
Windsor	95.9	91.8
Total	88.7	86.8

Source: Elaboration on CUDO survey, 2006

Table.20- Graduate Employment Rate, 2004

College	Employed six months after graduation
Algonquin College of Applied Arts and Technology	86.9
Cambrian College of Applied Arts and Technology	85.7
Canadore College of Applied Arts and Technology	83.8
Centennial College	81.4
Collège Boréal	86.5
Conestoga College Institute of Technology and Advanced Learning	93.8
Confederation College of Applied Arts and Technology	89.6
Durham College of Applied Arts and Technology	89.7
Fanshawe College of Applied Arts and Technology	91.5
Fleming College	86.7
George Brown College of Applied Arts and Technology	87.0
Georgian College of Applied Arts and Technology	93.4
Humber College Institute of Technology and Advanced Learning	87.9
La Cité collégiale	89.3
Lambton College of Applied Arts and Technology	87.8
Loyalist College of Applied Arts and Technology	90.1
Mohawk College of Applied Arts and Technology	90.7
Niagara College of Applied Arts and Technology	90.1
Northern College of Applied Arts and Technology	89.6
Sault College of Applied Arts and Technology	88.5
Seneca College of Applied Arts and Technology	82.9
Sheridan College Institute of Technology and Advanced Learning	88.1
St. Clair College of Applied Arts and Technology	88.5
St. Lawrence College of Applied Arts and Technology	90.4
Ontario Average	88.0

Source: Elaboration on Environmental Scan, 2008. Colleges Ontario

Table.21- Graduate Employment Rate by program

Program area	Six months after 2005 graduation (%)	Two years after 2005 graduation (%)
Dentistry	100	100
Education	94.8	97.6
Law	97.4	96.1
Medicine	100	100
Optometry	100	100
Pharmacy	100	100
Veterinary Medicine	100	100
Forestry	100	100
Architecture	95.6	97.7
Business & Commerce	95.3	97.2

Engineering	90.9	96.8
Fine & Applied Arts	92.3	97.6
Food Science & Nutrition	95.2	96
Journalism	88.2	96.1
Nursing	98	99.2
Kinesiology/Recreation/ Phys-Ed.	96.4	97.9
Theology	100	100
Therapy and Rehabilitation	100	100
Social Science	93.1	96.4
Humanities	94.4	96.1
Other Arts and Science	91.3	96.4
Agricultural & Bio Sciences	90.3	92.5
Computer Science	93.9	97.7
Mathematics	89.4	97.2
Health Professions	93	96.7
Physical Sciences	89.7	95.7
Overall Average	93.9	96.9

Source: Elaboration on Environmental Scan, 2008. Colleges Ontario

Table.22- Graduate revenues by program

Program area	Six months after 2005 graduation (\$)	Two years after 2005 graduation (\$)
Dentistry	72,386	103,750
Education	40,914	47,992
Law	57,079	75,376
Medicine	51,154	68,333
Optometry	85,500	86,429
Pharmacy	68,929	83,571
Veterinary Medicine	61,087	70,714
Forestry	45,000	52,500
Architecture	35,278	41,842
Business & Commerce	41,466	52,383
Engineering	48,726	58,383
Fine & Applied Arts	29,333	36,911
Food Science & Nutrition	28,704	44,722
Journalism	30,405	40,870
Nursing	53,864	58,927
Kinesiology/Recreation/ Phys-Ed.	31,649	42,647
Theology	57,500	70,000
Therapy and Rehabilitation	44,412	50,313
Social Science	36,619	43,996
Humanities	33,935	41,550

Other Arts and Science	40,392	49,954
Agricultural & Bio Sciences	30,975	42,038
Computer Science	46,355	56,828
Mathematics	44,011	50,814
Health Professions	45,075	51,410
Physical Sciences	37,917	48,860
Overall Average	41,046	49,669

Source: Elaboration on Environmental Scan, 2008. Colleges Ontario

Table.23- Correlations among Brain Gain/ Brain Drain Index (BGBDI), Regional Innovation and Growth

	BDBGI
Patent growth	0,706
Tech Pole	0,577
Ht share	0,827
Population growth (00-06)	0,254
Employment growth (00-06)	0,119
Income growth (01-06)	0,742

Source: Elaboration on MPI data, 2008

Table.24-Correlation of University (and Colleges) and Talent Measures

	Students	Faculty
Talent Index	0,528	0,506
SC	0,551	0,530
CR	0,960	0,980

Source: Elaboration on MPI data (2008), CUDO survey (2006), Environmental Scan-Colleges Ontario (2008)

Table.25- Number of degree seeking students (headcount) enrolled for Fall 2006

	Male	Female	Tot. Canadian	Male	Female	Tot. Visa	TOT
GUELPH	8,335	12,672	21,007	317	332	649	21,656
McMaster	9,533	13,182	22,715	943	607	1,550	24,265
Queen's	7,526	9,867	17,393	497	359	856	18,249
London Un.	16,852	28,793	45,645	1,091	1,343	2,434	48,079
Nipissing	1,370	3,745	5,115	19	43	62	5,177

UOIT	2,266	1,829	4,095	147	57	204	4,299
Ottawa Un.	21,319	28,504	49,823	2,119	1,570	3,689	53,512
Trent	2,628	5,266	7,894	206	211	417	8,311
Brock	6,396	9,838	16,234	425	486	911	17,145
Laurentian	2,731	5,691	8,422	198	106	304	8,726
Lakehead	3,032	4,165	7,197	87	58	145	7,342
Toronto Un.	57,358	81,215	138,573	5,645	5,296	10,941	149,514
Waterloo Un.	18,365	19,394	37,759	2,559	935	3,494	41,253
Windsor	6,346	8,892	15,238	1,051	503	1,554	16,792
Total	164,057	233,053	397,110	15,304	11,906	27,210	424,320

Source: Elaboration on CUDO survey, 2006

Table.26- Number of instructional faculty members (Fall 2006) by gender

	Total Faculty	Women	
Guelph	795	243	(30.5%)
McMaster	843	278	(33.0%)
Queen's	832	287	(34.5%)
London Un.	1247	387	(31.0%)
Nipissing	143	64	(44.8%)
UOIT	90	31	(34.4%)
Ottawa Un.	1882	640	(34.0%)
Trent	266	99	(37.2%)
Brock	565	242	(42.8%)
Laurentian	401	140	(34.9%)
Lakehead	290	87	(30.0%)
Toronto Un.	6331	1,834	(29.0%)
Waterloo Un.	1414	417	(29.5%)
Windsor	516	191	(37.0%)
Total	15615	4940	(31.6%)

Source: Elaboration on CUDO survey, 2006

Table.27-Correlation between University Strength and Tolerance

	Log Students	Log Population
Tolerance Index	0,374	0,387
Mosaic Index	0,668	0,802
Gay/Lesb Index	0,716	0,847
Bohemian Index	0,686	0,823
Integration Index	0,533	0,302

Source: Elaboration on MPI data (2008), CUDO survey (2006), Environmental Scan-Colleges Ontario (2008)

Author Bio

Carla Sedini is a PhD student of the Information Society Doctorate (QUA_SI project: Quality of Life in the Information Society-XXI cycle) at the Università degli Studi di Milano-Bicocca. She has collaborated with the Department of Sociology since 2003 where her prior academic work was focused. Besides working on the themes of mobility and accessibility of urban spaces, she deals with the study of the role of the creative and knowledge industry in cities. In particular, for her PhD thesis she is developing an empirical study about the synergy between creativity and management in contemporary urban societies through educational and working processes. She is in the Italian group of research which is taking part to the European project ACRE: Accommodating Creative Knowledge – Competitiveness of European Metropolitan Regions within the Enlarged Union.

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