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# Ontario Community Colleges in the Creative Age: Bohemians, Bioinformatics, and the Built Environment

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Prepared by:

Allison Bramwell

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# Ontario Community Colleges in the Creative Age: Bohemians, Bioinformatics, and the Built Environment

By
Allison Bramwell
Program on Globalization and Regional Innovation Systems (PROGRIS)
Munk Centre for International Studies
University of Toronto
Contact: Allison.bramwell@utoronto.ca

## Introduction

A great deal of scholarly and policy attention has recently been focused on the contribution of highly skilled and talented people to regional economic growth and innovation. There is a lively debate between those who argue that knowledge-intensive and innovative firms attract highly talented and creative people (Storper and Manville 2006; Scott 2007), and those who argue that large pools of creative 'talent' attract and nurture innovative firms (Florida 2002; Markusen and Shrock 2006). Either way, there is little debate over the critical link between innovation, economic growth, and person-embodied knowledge spillovers which make highly educated and creative workers one of the most prized locational resources. This virtuous interaction effect is often captured under the loose rubric of the 'creative economy'.

Community colleges tend to be absent from theoretical and empirical studies of occupational creativity. One of the core assumptions in the creative economy literature is that 'creative' occupations in innovative industries require high levels of formal post-secondary education in universities.[1] Beyond assumptions that these workers are university educated there tends to be little attention to the varied educational pathways that knowledge workers in creative occupations and industries can take. While it is well-known that community colleges train lab technicians, auto mechanics, hairdressers, and child care workers, whose economic contributions are also critical, it is less known that many colleges also offer a wide range of innovative degree and postgraduate programs that train highly skilled and educated workers specifically for 'creative economy' occupations and industries - that universities often do not.

[1] Florida, Mellander and Stolarick (2008) state that: "The conventional measure of human capital is educational attainment – generally, the share of the population with a bachelor's degree and above" (p. 618).

This paper argues that analytical attention to the drivers of regional economic growth in the 'creative age' needs to focus more explicitly on the role of colleges in educating workers in 'creative occupations'. Community colleges make critical contributions to Ontario's creative economy in several important ways. First, not only do colleges provide important career pathways for student mobility from colleges into universities, they also provide university graduates with professional and applied Post Diploma programs to improve their technical skills and post-graduation employment prospects in specific fields. Second, colleges also provide highly educated graduates through four year Applied Bachelor and Joint Bachelor degree programs, many of which have a competitive admissions process, and require university level high school courses as pre-requisites.[2] Many of these programs link students directly to local – and in some cases, non-local - employers through their reputation for providing employment ready graduates trained in industry relevant concepts and skills, and through internship and co-operative education opportunities. Finally, and perhaps most importantly, colleges arguably contribute *more* to the creative economy than universities in some occupational categories. Many of the career pathways for 'super creative core' occupations that are the hallmarks of creativity and innovation such as fashion, interior, and industrial design, digital and multi-media, and contemporary film and music production, are provided in colleges rather than universities.[3] Colleges offer a wide range of programs in arts, applied sciences, engineering, and many aspects of design; they produce not only more than their fair share of painters, musicians, writers, and actors, they also train civil and chemical engineers, photonics and bioinformatics specialists, and urban planners and industrial designers.

The discussion will proceed as follows. First, there will be a brief review of the 'creative class' literature, with a particular focus on arguments that emphasize the economic impact of creative occupations in the arts, and engineering and applied sciences (Florida 2002; Stolarick and Florida 2006; Knudsen et al. 2007; Florida et al. 2008; Gertler et al. 2002; Wu 2005). From this review, we can generate a narrow definition of 'creative occupations', which isolates two broad occupational categories that clearly meet the criteria of 'creative occupations' as defined in the literature. These include Arts, Design and Entertainment occupations, and Engineering and Applied Sciences occupations. The second section provides a comparative analysis of publicly available quantitative data across these two occupational categories for college and university graduates. Summary statistics on income, education, and employment by major field of study suggest that while university graduates tend to have higher incomes than college graduates, this is not the case for all 'creative' occupations; some college graduates report higher incomes than university graduates in some creative occupations. Summary statistics on student mobility suggest that colleges provide not only important

[2] Applied Bachelor degrees are 4 year college degrees conferred by the college under Ministerial consent. Joint or collaborative Bachelors degrees are delivered in partnership with universities, and typically result in a university-conferred Bachelor degree and a college diploma.

[3] The exception in Ontario is Ryerson University, which operated as a polytechnic until it was conferred university status in 1993.

pathways to university degree programs, but also important opportunities for university graduates to obtain occupationally-specific applied training. These data do not, however, capture four year and post diploma college programs. In order to get a clearer indication of the range of innovative applied degree, joint degree, and post diploma college programs and their relevance to the creative economy, the third section will give a brief overview of the range of programs that clearly meet the criteria of 'creative occupations', augmented by a series of very brief case studies of individual programs (see Appendix A).

A few caveats are in order at this point. The emphasis on two narrow occupational categories, and on four year and post-graduate college programs, is in no way meant to suggest that these college activities are the only ones of note. Rather, it is argued here that the fact that colleges can be shown to make important economic contributions even according to a very narrow definition of 'creative occupations', suggests that their contributions to regional social and economic growth and development are indeed much broader, and worthy of further empirical investigation. In addition, this paper is not a systematic or exhaustive empirical account, but rather draws on and summarizes the somewhat scarce existing data and research to support the core argument. Further empirical research into the social and economic role of Ontario's community colleges is required to substantiate and further develop the policy implications of the arguments advanced here.

## Occupational Dimensions of the 'Creative' Economy

There is a dizzying array of new forms of economic activity in the current 'creative age'. New economy sectors are "endemically given to continuous learning and hyper-innovation in all phases of their growth" (Scott 2006, 2). Sector-based notions of the modern economy are being rendered obsolete by "the merging roles of manufacturing and service activities", where firms must be capable of both mass production and knowledge-based activities (Simmie and Wood 2002, 150). Likewise, while many economic activities still occur in identifiable industry sectors that employ workers in identifiable, industry-specific occupations, many emerging activities, and the occupations within them, are less easily captured. Scott (2007) describes these shifts in terms of an emerging "cognitive cultural economy" where leading edge economic growth and innovation is driven by "technology-intensive manufacturing, diverse services, fashion-oriented neo-artisanal production, and cultural products industries", in which the progressive adoption of digital technologies has facilitated the "deroutinization of labor processes and the destandardization of outputs" (p. 1466, 1471). While the 'cognitive cultural economy' is most evident in "intra-urban industrial districts devoted to specialized facets of cognitive cultural production" in large metropolitan areas such as high tech and software in the San Francisco Bay area, movies in Hollywood, business and financial services in New York and London, and fashion in Paris and Milan, there is increasing evidence of these dynamics in other places such as Montreal (Stolarick and Florida 2006).

A major contribution of recent theories that link the skills of workers to the economic prosperity of cities, such as Florida's 'creative class', is the measurement of knowledge-intensive, or 'creative' industries by individual occupation rather than the activities of firms, and the ability to operationalize this occupational creativity (Florida 2002; Knudsen et al. 2007; Stolarick and Florida 2006). The creative class idea captures a range of human capital driven outputs from "people whose job it is to create new ideas, new technology, and new creative content" (Wu 2005, 2). Florida defines creative class occupations as those in which individuals "engage in complex problem solving that involves a great deal of independent judgment and requires high levels of education of human capital" (Florida 2002, cited in Florida et al. 2008, 625). In his original empirical investigation of the occupational dimension of knowledge-intensive economic activities, Florida (2002) uses the Standard Occupational Classification (SOC) to divide occupations into the three primary categories of the 'creative class', the 'service class', and the 'working class'. The 'creative class' is further divided into the 'super creative core' and 'creative professionals'. The 'super-creative core' is broadly defined as occupations in the fields of computers and mathematics, architecture, engineering, life sciences, physical sciences, social sciences, education, training and library, and arts, design, entertainment and media.

According to Florida, it is the presence of idea-generating, knowledge-intensive and creative occupations in the 'super-creative core' that drive innovation in the creative economy. Recent empirical research has found positive correlations between agglomerations of artists, other non-science occupations, and entrepreneurs, and economic dynamism, as well as relatively high correlations between artistic and entertainment occupations and regional labour productivity (Wojan et al. 2007; Markusen and Schrock 2006; Stolarick and Florida 2006). In testing for the effects of the creative class, human capital, and individual occupations on regional wages and incomes, Florida et al. (2008) find that some occupations affect regional development more than others: education and health care had smaller impacts than computer science, engineering, management, and business and financial operations. 'Cultural economy' occupations in the arts, design, media and entertainment have both direct and indirect relationships to regional development. Not only do these occupations have strong significant correlations with both regional wages and income, there is also a positive relationship between cultural occupations and the development of high technology industries because "these occupations also create value in other more traditional technologies by leveraging design and other creative skills into the final product and production process" (Florida et al. 2008, 644). Similarly, scientists and engineers have the greatest impact on growth when their presence is combined with a large and diverse pool of skilled workers in other non-science and 'cultural' occupations (Beckstead et al. 2008). The 'creative milieu' identified by Stolarick and Florida (2006) is characterized by high levels of technology and innovation alongside high levels of bohemians. This view suggests that the attributes of places that make them attractive to talented workers are of

paramount importance in driving local economic prosperity (Gertler et al. 2002). Such talent is attracted to and retained by cities that offer rich employment opportunities, a high quality of life, a critical mass of cultural and entertainment activity, and social diversity (Florida 2002; Glaeser and Gottlieb 2006).

In terms of other measures of occupational creativity, human capital theory postulates that wages rise in relation to levels of knowledge and skill, and indeed, the correlation between human capital measured by educational attainment, and income is one of the most robust in economics. With an alternative emphasis on occupation rather than human capital, however, Florida et al. (2008) take the analysis a step further, and test for the effects of human capital, the creative class, and individual occupations on both regional wages and incomes.[4] They find that human capital, measured by educational attainment, and the creative class, measured by occupational skill, each play different but complementary roles in regional development; occupation has a positive effect on regional labor productivity, and human capital increases regional income and wealth. Either way, both wages and income are positively correlated with regional economic growth.[5]

At the same time, while acknowledging the usefulness of measuring human capital by educational attainment – "usually the share of a population with a bachelor's degree and above" - Florida et al. argue that this captures "only a part of a person's capability that reflects accumulated experience, creativity, intelligence, innovativeness and entrepreneurial capabilities as well as level of schooling" (2008, 616). An emphasis on educational attainment obscures the economic contribution of successful entrepreneurs who may lack formal post-secondary credentials, and does not allow "nations or regions to identify specific types of human capital or talent" upon which regional growth strategies can be built (ibid., 616). Instead, they argue that occupation is a "more robust measure of utilized skill" because while education provides an underlying level of capability, this capability requires "creativity, intelligence and on-the-job knowledge and accumulated experience" in order to be converted into "productive work" (ibid., 616, 619). Thus, they examine the impact of *both* human capital and occupation on regional development and find that human capital is positively correlated with regional income. As a result, human capital remains a necessary, if not sufficient, proxy for occupational creativity, and much of the 'creative class' literature assumes that its members have at least a university bachelor's degree (Florida et al. 2008; Wu 2005; Wojan et al 2007). In this way, income and educational attainment (measured by a university degree) are included in the creative class rubric.

[4] While Florida et al. (2008) distinguish between income and wages, where wages are a measure of regional labor productivity, and income reflects regional wealth but is less place dependent, wages and income are highly correlated. This discussion will use income as a broad measure that includes both income and wages as defined by Florida et al. (2008).

[5] One of the drawbacks of this analysis is the implication that all creative occupations enjoy high incomes, which is not, particularly in the case of artists, always the case.

The purpose of this brief review of the 'creative class' literature is to isolate several key measures for a narrow definition of creative occupations in order to examine the extent to which community college provide education and training that meet these criteria. Though the ensuing definition is somewhat stylized for the purposes of discussion, we can now isolate three core criteria for a narrow definition of 'creative occupation'. First, though the creative class encompasses a wide variety of occupations, we focus here on the two broad occupational categories of Arts, Design and Entertainment as typifying cultural economy activities, and Scientists and Engineers as typifying knowledge- and technology-intensive occupations. Second, creative occupations enjoy comparatively high levels of income. Third, creative occupations require high levels of educational attainment, measured by a four year, or university degree.

## Colleges and the Creative Class: Comparing Creative Occupations, Income and Educational Attainment

Ontario's 24 Colleges of Applied Arts and Technology (CAATs) are located throughout the province on more than 100 campuses and 850 learning sites. They vary in size according to enrolment, ranging from 1,500 to 14,000 full-time students, and employ 15,000 full-time, and 19,000 part-time faculty and staff. They provide a wide range of career-focused education and training programs, through various program types, which include 1 year certificate, 2 and 3 year diploma, 4 year applied degree and joint degree, graduate certificate, and apprenticeship programs.[6] Total full-time enrolment is approximately 180,000 and part-time enrolment is approximately 350,000. The annual graduation rate is approximately 60,000 in all programs.[7]

### Table 1: Full-time Equivalent Enrolment and Number of Graduates by College 2005-2006

| Institution | Total FTE | % of Total | Total Graduates |
|---|---|---|---|
| Algonquin | 14,786 | 8.1 | 4,681 |
| Collège Boréal | 1,445 | 0.8 | 540 |
| Cambrian | 4,022 | 2.2 | 1,569 |
| Canadore | 2,924 | 1.6 | 1,262 |
| Centennial | 9,957 | 5.4 | 3,331 |
| Conestoga | 6,722 | 3.7 | 1,966 |
| Confederation | 3,201 | 1.7 | 1,146 |
| Durham | 6,948 | 3.8 | 2,043 |
| Fanshawe | 12,642 | 6.9 | 4,452 |

[6] A complete listing of college programs is available at www.ontariocolleges.ca.

[7] In comparison, total full-time enrolment at Ontario universities for 2005-2006 in all programs and degree levels is 348,252, and part-time enrolment is 82,797. Total degrees granted in 2005 were 84,138. (Statistics Canada, 2006 Census, Summary Tables, "University enrolments by registration status", and "University degrees, diplomas, and certificates granted by province".

| | | | |
|---|---|---|---|
| Fleming | 6,078 | 3.3 | 2,453 |
| George Brown | 15,679 | 8.6 | 4,643 |
| Georgian | 6,941 | 3.8 | 2,270 |
| Humber | 16,195 | 8.8 | 4,464 |
| La Cité | 3,388 | 1.9 | 979 |
| Lambton | 2,287 | 1.2 | 781 |
| Loyalist | 3,317 | 1.8 | 1,159 |
| Mohawk | 10,633 | 5.8 | 3,394 |
| Niagara | 6,817 | 3.7 | 2,579 |
| Northern | 1,343 | 0.7 | 570 |
| Sault | 2,085 | 1.1 | 715 |
| Seneca | 19,225 | 10.5 | 5,435 |
| Sheridan | 13,932 | 7.6 | 4,278 |
| St. Clair | 7,142 | 3.9 | 2,378 |
| St. Lawrence | 5,348 | 2.9 | 1,941 |
| **Total** | **183,024** | **100.00** | **59,029** |

## Table 2: Graduates by selected creative occupation cluster, 2005-2006

| | **Total Graduates** | **% of Graduates** |
|---|---|---|
| **Applied Arts** | | |
| Advertising and Design | 1898 | 3.2 |
| Art | 783 | 1.3 |
| Fashion | 714 | 1.2 |
| Media | 2895 | 4.9 |
| Performing Arts | 452 | 0.8 |
| **Technology** | | |
| Architectural | 577 | 1.0 |
| Chemical/Biological | 590 | 1.0 |
| Civil | 1093 | 1.9 |
| Electronics | 2766 | 4.7 |
| Mechanical | 2064 | 3.5 |
| **Total** | **13, 832** | **23.5** |

Source: Employment Profile: A summary of the Employment Experience of 2005-2006 College Graduates Six Months After Graduation, Ontario Ministry of Training, Colleges and Universities, 2007. www.edu.gov.on.ca/eng/document/serials/eprofile05-06/

Table 2 indicates that almost one quarter of college graduates earn credentials in selected creative occupational categories. These data, however, provide little indication of the effectiveness of these programs in terms of their returns to the regional economy. It would be useful here to have data on, for example, employment rates, and location of employment of college graduates in these programs. One of the difficulties of conducting research on college activities in Canada, is the limitation in the availability of data. In this context, further research would be required to obtain detailed data on college placement rates and location of post graduate employment.

## Income

This paper argues that colleges make important contributions to the creative economy by educating and training individuals in 'creative class' occupations that have a positive effect on regional economic growth. Therefore, we need an indication of the income effects of educational attainment on the income of college graduates. Drawing from 2001 Census data, Table 3 compares the average employment income of college and university graduates in the two broad creative occupational categories of Arts, Design, and Entertainment, and Sciences and Engineering that we have selected for this analysis. For the Arts and Design category, the data suggest that there are more than twice as many college graduates as university graduates for this occupational category, but that university graduates appear to have higher average employment incomes across all five sub-categories.

In contrast, there is some interesting variation within the Sciences and Engineering category. Considering only occupational sub-fields that are offered at both the college and university level, while the aggregate data for Engineering and Applied Sciences indicates that university graduates have a significantly higher average employment income ($59, 709 for university graduates and $35,154 for college graduates), a closer inspection reveals a more nuanced picture. For electrical and electronic engineering, there are many more university graduates (26,260) than college graduates (1,545), and the discrepancy in average employment income is also substantial ($61,253 for university graduates and $27,612 for college graduates). The situation is reversed, however, when considering industrial and mechanical engineering, where there are significantly more college graduates (25,470 to 845, and 43,110 to 215 respectively). Likewise, average employment income in these occupational sub-fields is substantially *higher* for college graduates ($49,709 for college graduates to $31,902 for university graduates in industrial engineering, and $46,101 for college graduates to $33,726 for university graduates in mechanical engineering). A similarly inconsistent pattern emerges in the physical sciences. University graduates in Geology and Physics occupations appear to have significantly higher average incomes than their college counterparts. College and university graduates in Metallurgy and Materials science, and in Chemistry, however, have the same average employment income.

These findings are consistent with those of a Statistics Canada research paper which draws data from the National Graduates Survey comparing median earnings for bachelor's level university and college graduates (Allen, Harris, and Butlin 2003). The study found that there was a significant discrepancy between the median earnings of university and college graduates; bachelor graduates of the class of 1995 working full-time had median earnings of $32,000 two years after graduation, and college graduates had median earnings of $25,000. In addition, the absolute gap of $7,000 persisted five years after graduation, even though median earnings for the two groups had risen to $40,000 and $33,000 respectively. These findings were not, however, consistent across occupational

categories. The best paid disciplines for college graduates based on 1995 data were engineering and applied sciences, followed by health sciences.[8] In fact, engineering and applied science was the only field of study at the college level that resulted in salaries within the range of university disciplines, and "the median income for 1995 college graduates in this field was equal to the median income of bachelor graduates overall" (Allen, Harris and Butlin 2003, 28).

The implications of these data are arguably less clear, however, for occupations in the arts and humanities, which offer greater opportunity for higher earnings and greater risk for lower earnings. Artists, in particular, have high rates of self-employment and intermittent employment, and in many cases such as writers, get paid in lump sums upon project completion. The study indicates that the earnings of college graduates in the social sciences tend to be clustered around the median, while arts and humanities graduates face a greater "risk" of substantially higher or lower earnings. In addition, differences in the range of earnings received by college and university graduates in the arts and humanities are not particularly great. While the median earnings of college graduates range from $25,000 to $45,000 in Arts and Humanities, the median earnings of university bachelor graduates in Arts and Humanities is $30,000 to $45,000 (Allen, Harris and Butlin 2003, 24). In other words, the discrepancy in earnings between college and university graduates in the arts is not a large one, and median earnings at the top end of the range are the same for college and university graduates.

### Table 3: Education and Income by Major field of Study, 2001

| | College (Diploma or Certificate) | | University (Bachelor's Degree) | |
|---|---|---|---|---|
| **Major Field of Study** | **Count** | **Average Employment Income** | **Count** | **Average Employment Income** |
| **Fine and Applied Arts** | 59,945 | $28,576 | 24,325 | $32,481 |
| Fine Arts | 6,740 | $28,981 | 9,885 | $32,700 |
| Music | 3,590 | $25,780 | 6,170 | $29,862 |
| Graphic and audio-visual arts | 16,620 | $32,390 | 2,405 | $37,074 |
| Creative and design arts | 12,645 | $29,109 | 2,685 | $36,774 |
| Communications and media studies | 19,035 | $36,382 | 16,235 | $42,133 |
| **Engineering and Applied Sciences** | 7,065 | $35,154 | 106,275 | $59,709 |
| Electrical/electronic engineering | 1,545 | $27,612 | 26,260 | $61,253 |
| **Applied Science Technologies and** | 298,020 | $45,276 | 2,075 | $38,467 |

[8] The National Graduate Survey is a time series of data on employment and income of college and university graduates collected six months and two years after graduation. As of this writing, the most recent data had not yet been publicly released.

| **Trades** | | | | |
|---|---|---|---|---|
| Industrial engineering technologies | 25,470 | $49,709 | 845 | $31,902 |
| Mechanical engineering technologies | 43,110 | $46,101 | 215 | $33,726 |
| **Mathematics, Computer and Physical Sciences** | 12,695 | $39,254 | 85,995 | $55,492 |
| Chemistry | 2,815 | $46,604 | 9,230 | $48,774 |
| Geology and related fields | 1,175 | $34,005 | 3,530 | $48,812 |
| Metallurgy and materials science | 800 | $58,508 | 425 | $58,619 |
| Physics | 485 | $44,258 | 5,235 | $55,046 |

Source: Highest Degree, Certificate or Diploma, Major Field of Study, Employment Income for Total Population 15 Years and Over for Ontario. Ottawa. Statistics Canada, July 2003. 2001 Census of Canada.

This also suggests that there is a great deal of variation in income *within* the arts and humanities occupational category. Table 4 presents selected data from the Ministry of Training, Colleges and Universities (MTCU) Student Satisfaction Survey, which summarizes the employment experiences of college graduates six months after graduation. Keeping in mind that these are earnings for recent graduates who often begin at the lower end of the pay scale, the data indicate that there is a large range in average earnings even across occupations within the narrow occupational category of Media. While Radio and Television Broadcasting reports average earnings of $23,872, and Book and Magazine Publishing, Creative Book Publishing, Game Design and Development and Interactive Multimedia

### Table 4: Post Diploma Programs in Media (2005-2006), Six Months After Graduation

| **Programs** | **Total Grads** | **Full-time Employed, Prg-Related** | **Part-Time Employed, Prg-related** | **Average Earnings of Full-Time Employed** | **Colleges offering Program** |
|---|---|---|---|---|---|
| Advanced Television and Film | 72 | 45.7% | 8.7% | $33,315 | Humber, Sheridan |
| Book and Magazine Publishing | 62 | 62.8% | 7.0% | $29,193 | Centennial |
| Broadcasting – Radio and Television | 44 | 50.0% | 3.8% | $23,872 | Fanshawe, Humber |
| Computer | 140 | 42.9% | 2.0% | $39,677 | Humber, |

| | | | | | |
|---|---|---|---|---|---|
| Animation | | | | | Seneca, Sheridan |
| Computer Graphics | 22 | 50.0% | 7.1% | $35,974 | Humber, Sheridan |
| Creative Book Publishing | 27 | 41.2% | - | $31,843 | Humber |
| Creative Writing | 130 | 12.6% | 6.3% | $46,592 | Humber |
| Dramatic Scriptwriting | 14 | 10.0% | - | - | Algonquin |
| Game Design and Development | 16 | 36.4% | - | $29,790 | Seneca |
| Independent Documentary Production | 8 | 40.0% | - | - | Humber |
| Media Arts – Interactive Multimedia | 99 | 44.8% | 3.0% | $30,711 | Algonquin, Centennial, George Brown, Niagara, Sheridan |
| Advanced Multimedia Techniques | 14 | 100.0% | | $33,475 | Humber |
| Technical Writer | 42 | 65.5% | 3.4% | $46,052 | Algonquin, Seneca |

Source: Employment Profile: A summary of the Employment Experience of 2005-2006 College Graduates Six Months After Graduation, Ontario Ministry of Training, Colleges and Universities, 2007. www.edu.gov.on.ca/eng/document/serials/eprofile05-06/

all hover around the $30,000 mark, Creative Writing and Technical Writing each report average earnings of $46,000. This suggests that there may be important income variations within the Arts, Design and Entertainment category that challenge assumptions about lower earnings for college graduates in the arts and humanities.

This brief comparison of average employment income and earnings between college and university graduates is therefore inconclusive about the relative economic impact of human capital measures in these two occupational streams. Not only do college engineering graduates have similar or higher incomes than university engineering graduates in some occupational categories, but the discrepancy in median incomes in the arts and humanities between college and university graduates is not substantial, and may be due to other effects such as high rates of self-employment and project-based work.[9] In addition, and most importantly, these data do not capture college programs beyond the three year

[9] It is unclear what accounts for the income premiums on these college-educated technical occupations, and the extent to which they require analytical skills. Like several other areas outlined in this study, this is an area that requires further empirical investigation.

Advanced Diploma level. As will be discussed in more detail below, colleges offer a variety of four year Applied, joint degree, and post diploma programs that are not reflected in these data.

## Educational Attainment

Most discussions of post-secondary educational attainment assume that bachelor's degrees are granted only through the authority of universities. Colleges are largely absent from discussions of post-secondary attainment of bachelor's degrees, presumably largely because there is little awareness that colleges do confer degrees. The paucity of theoretical and empirical analyses of the role of colleges in regional social and economic development underscores the fact that "community colleges deserve more attention than they usually receive" (Shaw and Jacobs 2003, 7). From a broad structural perspective, colleges act as an important conduit between secondary schools, the labour market, and further education in universities. Beyond this core function, however, there is a broad range of college roles and activities that vary "enormously" across and within national contexts, making them "difficult to describe as a group" because "almost nothing that can be said about these institutions is universally true" (Grubb 2003, 1). In an effort to capture this broad range of activities, Grubb refers to these institutions as "tertiary colleges", all of which provide clear – and in some ways, preferable – alternatives to universities in the form of "greater flexibility, greater access and equity, more overtly occupational and economic goals, [and] a different approach to research and public service" (ibid. 1).

In his comparison of tertiary colleges across OECD countries, Grubb describes college activities along a continuum between 'educational institutions' and 'trade schools'. 'Educational institutions' are places where "students discover their own identities" and "make the transition from adolescence to adulthood", and as such, have an active student life and "provides more than the subject matter for a major subject" (ibid., 43). In contrast, trade schools "simply provide the courses necessary to earn particular qualifications", and "the institution is not seen as a place of other forms of development or a focus of social life", and "the range of student services is limited or non-existent" (ibid., 43). He finds that different colleges in Canada exhibit varying characteristics of both educational institutions and trade schools; while some are highly-developed and offer a wide range of student services, an active student life and extra-curricular activities, others are more like trade schools and offer few ancillary services. In this context, he argues that a flexible or "hybrid" institution that provides both the services and support of an educational institution, as well as a broad range of courses and programs offered on non-standard schedules, allows students to choose the type of institution they want to attend, and finds that "the best examples of such hybrid institutions are the better community colleges in the U.S. and Canada which "incorporate lifelong learning alongside well-developed colleges" (p. 45).

The broad range of program offerings of Ontario colleges underscores this "hybrid" approach to post-secondary education. College offerings can be roughly described according to three different though not discrete functions. First, colleges provide a wide range of academic upgrading activities that range from high-school equivalency GED certificates, literacy and ESL (English as a Second Language), and foundation year programs that prepare students to enter the regular college curriculum. Second, colleges are perhaps best known for offering one year (certificate), two year technician, and advanced three year technologists diploma programs in specific occupational categories, many of which have mandatory co-op components, as well much of the in-school portion of apprenticeships, corporate training and skills upgrading programs, and in many cases, distance education courses. However, what is less well-known and most relevant to this discussion, is that colleges also offer a range of degree programs and post graduate programs. These include four year Applied Bachelor's degrees granted by colleges under Ministerial consent, Joint four year degrees between colleges and universities that allow students to earn both a college diploma and a university degree, and Post diploma programs for students who have already completed a college diploma or a university degree.

## Career Pathways: Student Mobility Between Colleges and Universities

Within national systems of innovation, some of the most important linkages colleges have involve ties with universities. These take the primary forms of student transfers and joint degrees. Part of the original mandate of community colleges in Ontario was to provide academic preparation for students who wished to continue their studies at university. Colleges have become increasingly important intermediaries in the development of career pathways that facilitate occupational advancement through the acquisition of additional educational or occupation-specific credentials (Fitzgerald 2004).[10] There is evidence to suggest that there is a great deal of student mobility not only from colleges to universities, but also from universities to colleges. The college transfer function ties community colleges to universities through articulation agreements, which give recognition for completed college studies and facilitate credit transfer from college programs toward university degrees.[11]

A recent study commissioned by the College-University Consortium Council indicates that many students who have completed a college diploma choose to

[10] Colleges are referred to here as intermediaries because "what sets intermediaries apart from traditional job-training providers is their effectiveness in bridging the divide between employers and potential employees" (Fitzgerald 2004, 3). Colleges have direct links with employers through co-op programs, which are mandatory for many programs, as well as through Program Advisory Committees (PACs) made up of representatives from industry to ensure that program curricula are relevant to employer needs.

[11] A comprehensive list of all articulation agreements is available in the Ontario College-University Transfer Guide, www.octug.on.ca.

further their education at either college or university (CUCC 2007).[12] Table 5 indicates that although college graduates are more likely to continue their education at college than at university, the gap has narrowed in recent years, and the proportion of graduates transferring to universities has increased to almost one-third of all students who are furthering their education.

**Table 5: Where college graduates are furthering their education.**

| Year | College | University | Other | Responses |
|---|---|---|---|---|
| 2001-02 | 68.0% | 26.2% | 4.8% | 8,509 |
| 2002-03 | 68.4% | 26.8% | 4.6% | 8,874 |
| 2003-04 | 65.4% | 29.3% | 5.1% | 10,533 |
| 2004-05 | 62.3% | 32.7% | 4.7% | 11,730 |
| 2001-05 combined | 65.7% | 29.1% | 4.8% | 39,648 |

Source: Compustat Consultants, Inc. "College-University Transferability Study", report prepared for the College-University Consortium Council, March 21, 2007. www.ccuc-ontario.ca .

Table 6 indicates that at several colleges (Canadore, La Cité Collégiale, Seneca, Sault, and Humber) more than 10% of graduates transferred to university in 2004-2005. Table 7 indicates the universities to which college graduates are transferring. For several colleges (Algonquin, Canadore, Centennial, Humber, La Cité. Mohawk, Seneca, and Sheridan), over 30% of the students who were continuing their studies transferred to universities. In addition, it appears that college graduates who are transferring to university tend to transfer to universities that are geographically proximal to their original college.

At the same time, however, there is also evidence of student transfers from universities to colleges. Another recent study of post-secondary student mobility prepared by the Association of Colleges of applied Arts and Technology suggests that many college graduates also hold a university bachelor's degree, indicating that many graduates have previously completed university before attending college (ACAATO 2005). Though raw data indicating the numbers of university students who continue their studies at college are not readily available, data from the National Graduate Survey indicates that 13% of Ontario's college graduates from the class of 2000 also had a university bachelor's degree, compared to 10% nationally.[13] Data from the Ontario College Application Service (OCAS) indicates that 6.7% of college applicants and 5.6% of college registrants provided

[12] The establishment of the College-University Consortium Council (CUCC) was announced by the Minister of Education in 1996, to "facilitate, promote and coordinate joint education and training ventures that will: aid the transfer of students from sector to sector; facilitate the creation of joint programs between colleges and universities; and, further the development of a more seamless continuum of postsecondary education in Ontario". The Consortium has developed the Ontario College-University Transfer Guide (OCUTG) as a resource that lists all collaborative programs and transfer agreements. For more information: www.cucc-ontario.ca

[13] Special Tabulation of the National Graduate Survey, Rae Review Discussion paper (October 2004), p. 20, cited in ACAATO, 2005, p. 13.

transcripts of previous university education (ACAATO 2005). In addition, data drawn from the Ontario Ministry of Training, Colleges and Universities Student Satisfaction surveys, 2001-2005 suggests that 7% of students enrolled in Ontario colleges report having a university degree, and 7% report "some university", a proportion which has held steady over the past four years (MTCU 2007).

**Table 6: Percentage of college graduates transferring to university by college (top 10)**

| 2003-2004 | | | 2004-2005 | | |
|---|---|---|---|---|---|
| **College** | **%** | **#** | **College** | **%** | **#** |
| La Cité | 11.0 | 95 | Canadore | 16.0 | 128 |
| Seneca | 11.0 | 392 | La Cité | 15.0 | 145 |
| Sault | 9.8 | 47 | Seneca | 13.3 | 519 |
| Canadore | 9.5 | 72 | Sault | 11.8 | 59 |
| Sheridan | 9.3 | 294 | Humber | 10.3 | 346 |
| Humber | 8.4 | 276 | Sheridan | 9.6 | 299 |
| Cambrian | 7.8 | 101 | Algonquin | 9.1 | 319 |
| Centennial | 7.4 | 200 | St. Clair | 9.0 | 157 |
| Niagara | 7.1 | 112 | Niagara | 8.6 | 159 |
| Lambton | 7.0 | 54 | Centennial | 7.9 | 203 |

Source: Compustat Consultants, Inc. "College-University Transferability Study", report prepared for the College-University Consortium Council, March 21, 2007. www.ccuc-ontario.ca .

These summary data drawn from various graduate surveys indicate that there is a great deal of student mobility between colleges and universities. It is significant that roughly 10% of college graduates choose to further their educations at universities, which supports the contention that colleges provide important pathways to university degrees. It is also notable, however, that a smaller, but still significant percentage of university graduates and students with some university education choose to continue their studies at colleges. These data cannot suggest why this is so, and it is plausible that students who are not successful at university choose to obtain college credentials. What is equally plausible, however, is that university graduates seek to improve their post-graduation employment prospects by obtaining occupationally-specific credentials from college programs.

## Table 7: College Transfers By Institution, Top 2 (2001-2005 Combined)

| From College | To College | To University | Top 1 or 2 Universities |
|---|---|---|---|
| Algonquin | 64.7% | 30.6% | Carleton (13.9%)<br>Ottawa (9.0%) |
| Cambrian | 79.8% | 17.8% | Laurentian (12.8%) |
| Canadore | 59.4% | 34.5% | Nipissing (20.2%)<br>Laurentian (2.7%) |
| Centennial | 57.0% | 36.4% | York (14.1%)<br>Ryerson (13.2%) |
| Collège Boréal | 82.4% | 13.7% | Laurentian (9.6%) |
| Conestoga | 63.6% | 29.8% | Wilfrid Laurier (5.4%)<br>Windsor (5.3%) |
| Confederation | 73.4% | 22.1% | Lakehead (16.4%) |
| Durham | 71.9% | 22.2% | Trent (5.1%)<br>UOIT (2.9%) |
| Fanshawe | 74.8% | 21.0% | Western (12.6%) |
| George Brown | 68.4% | 25.4% | Ryerson (10.7%)<br>York (7.3%) |
| Georgian | 70.8% | 23.1% | Laurentian (5.4%)<br>York (5.2%) |
| Humber | 57.0% | 38.3% | York (17.1%)<br>Ryerson (9.8%) |
| La Cité Collégiale | 49.7% | 38.5% | Ottawa (26.1%) |
| Lambton | 73.7% | 22.8% | Western (7.9%)<br>Windsor (7.3%) |
| Loyalist | 82.6% | 14.3% | Trent (3.2%) |
| Mohawk | 62.5% | 33.4% | McMaster (9.1%)<br>Brock (6.8%)<br>W. Laurier (6.8%) |
| Niagara | 66.2% | 28.8% | Brock (16.4%) |
| Northern | 84.4% | 11.3% | Laurentian (3.6%) |
| Sault | 63.6% | 25.6% | Laurentian (3.6%) |
| Seneca | 43.5% | 51.1% | York (25.1%)<br>Ryerson (14.9%) |
| Sheridan | 63.2% | 31.7% | Ryerson (8.3%)<br>York (8.0%) |
| St. Clair | 71.6 | 23.9 | Trent (12.2%) |
| St. Lawrence | 69.1% | 25.2% | Carleton (5.3%) |

Source: Compustat Consultants, Inc. "College-University Transferability Study", report prepared for the College-University Consortium Council, March 21, 2007. www.ccuc-ontario.ca .

In summary, the discussion to this point suggests that the relationship of community colleges to regional economic growth in relation to both income and educational attainment require further empirical investigation. We argue here that common assumptions about college credentials and income are not accurate and therefore obscure understandings of much college activity. First, aggregate data that compares the average employment income of college and university graduates in selected creative class occupations suggests that some college graduates earn as much – and in a few cases, more – than their university

counterparts. Similarly, summary data on student mobility between colleges and universities suggests not only that colleges provide important pathways for students wishing to continue their studies at the university level, but also that some university graduates choose to continue their studies at community colleges. Beyond income effects and linkages with universities, however, we argue that colleges also provide substantial returns to the 'creative economy' through innovative degree and post-graduate programs in creative class occupations. In fact, it is possible that colleges may make an even greater contribution than universities in some creative class occupations because they produce highly educated graduates with four year bachelor's degrees, who have both theoretical and applied knowledge of new, industry-specific technologies.

## College Degrees: Applied Bachelor's, Joint Bachelor's and Post Diploma Programs

This section provides a brief description of three program types – applied bachelor's, joint bachelor's and post diploma programs - in relation to the narrow set of creative occupations outlined above. Detailed statistical data on individual college programs is not readily available, and those that are available tend to reflect only aggregate data for all programs. As we have seen, however, this encompasses a wide range of program activity from one year certificate, two and three year diploma, apprenticeship, and upgrading programs, to four year Bachelor's and Post Diploma programs. Separate data are not available for the bachelor's and post graduate college programs that are the subject of the remainder of this analysis. In addition, many of these programs are relatively new, and have only begun to graduate their first cohorts, so they do not yet have systematic data on program outcomes. Therefore, we rely on qualitative data in the form of document reviews, and brief interviews with program administrators for a small number of programs selected in accordance with our narrow criteria for creative occupations. It is important to note that this is not an exhaustive list of degree and post diploma programs, but rather one chosen on the basis of the two broad occupational categories on which this analysis is based. It also does not include three year advanced diploma programs in many creative occupations, which also train highly skilled professionals in many creative occupations, but do not meet the narrow criteria on which this analysis is based. As such, this section does not do justice to the range and depth of college program offerings, even in creative occupations, but attempts instead, to give a preliminary indication of these activities through the use of selected examples. See Appendix A for a brief overview of several college programs of each type selected according to the narrow set of creative occupations outlined above.

## Applied Bachelor's Programs (4 year)

Applied degrees are baccalaureate degrees conferred by Ontario community colleges, under the authority of the Ministry of Training, Colleges and Universities (MTCU). These degrees have an applied, 'hands-on' focus, and prepare graduates to work in a profession, or earn a professional designation or standing while also earning a degree. Students graduate with a four year degree with an applied designation such as, for example, a Bachelor of Applied Arts, Bachelor of Applied Technology, or Bachelor of Applied Business, among others.[14] Though applied degrees have long been offered at Ontario universities, Ontario colleges began offering applied degree programs in 2003. Like university degree programs, applicants are typically required to have six university senior level courses in secondary school, with specific prerequisite courses at minimum final grade percentages. In addition, many of these programs have opportunities for work experiences and linkages with employers through co-op or internship components. Graduates who wish to continue their studies at the undergraduate or graduate level in universities are assessed on an individual basis, but typically earn advanced standing or credit toward a university degree.[15]

*Examples of Applied Bachelor's Degree Programs in Selected Creative Class Occupations:*

| | |
|---|---|
| Algonquin | Bachelor of Applied Arts – Interior Design<br>Bachelor of Applied Technology - Photonics |
| Conestoga | Bachelor of Applied Technology – Integrated Telecommunication and Computer Technologies (Teletronics) |
| ** Fanshawe[16] | Bachelor of Applied Arts – Integrated Land Planning Technologies |
| ** Humber | Bachelor of Applied Music – Contemporary Music<br>Bachelor of Applied Arts – Creative Advertising<br>Bachelor of Applied Arts – Interior Design<br>Bachelor of Applied Technology – Industrial Design |

[14] For a complete list of applied degree programs, see www.edu.gov.on.ca/eng/general/postsec/CAATconsents.html .

[15] College-university transfers, articulation, and degree completion agreements are complex, and in their early stages, and tend to be based on individual agreements between specific departments for specific programs, rather than between institutions as a whole. Establishing these linkages is not a seamless process and has met with difficulties, a detailed analysis of which is beyond the scope of this paper.

[16] Programs marked by ** are described in more detail in Appendix A.

| | |
|---|---|
| La Cité Collégiale | Bachelor of Applied Technology – Biotechnology |
| Seneca | Bachelor of Applied Technology – Environmental Restoration |
| | Bachelor of Applied Technology – Software Development |
| | Bachelor of Applied Technology – Control Systems |
| Sheridan | Bachelor of Applied Arts – Animation |
| | Bachelor of Applied Arts – Illustration |

## Joint Bachelor's Degree Programs (4 year)

In response to increasing student demand for the benefits of both college and university study, many colleges and universities have begun to establish partnership agreements that allow them to jointly deliver bachelor's degree programs. These Joint Bachelor's degrees require students to take both applied courses in colleges and theoretical courses in universities, and upon completion, they are typically awarded both a three year college diploma and a Bachelor's degree from the participating university. This allows the technical and applied portion of the program to be taught in laboratory facilities that are primarily located in colleges.[17] These partnership agreements take different forms, and tend to be negotiated between individual institutions on a program-by-program basis. Though most of these programs are relatively recent, some, such as the partnership between Sheridan College and the University of Toronto Mississauga in Art and Art History, has been operating since 1971.[18] Among other criteria, these partnerships are characterized by student demand, program affinity between the college and the university, commitment from both university and college leaders, geographic proximity, and clearly defined articulation agreements.[19]

*Examples of Joint Bachelor's Programs in Selected Creative Class Occupations:*

[17] With perhaps the exception of Applied Health Sciences such as Nursing, which is taught in a combination of college facilities and clinical environments such as hospitals. Some of the most successful and best-known joint programs have been in the area of Nursing, which confer the BScN degree. For more information see http://fhs.mcmaster.ca/nru/publications/factsheets/CollaborativeBaccalaureateNursing.pdf

[18] Graduates of this program hold a diploma in Art and Art History from Sheridan College and a Bachelor of Arts degree for the University of Toronto. Graduates enter teaching, or work as professional artists, art historians, commercial photographers, illustrators, gallery directors, art curators, and graphic designers.

[19] Other examples include partnerships between Seneca College and York University and Sheridan College and York University, the Georgian College University Partnership Centre, the University of Guelph and Humber College, and between Centennial College and the University of Toronto Scarborough, to name a few. For more details see www.pccat.ca/presentations/partnership.pdf.

| | |
|---|---|
| Algonquin/Carleton | Bachelor of Information Technology – Interactive Media and Design<br>Bachelor of Information Technology – Network Technology |
| Centennial/ University of Toronto Scarborough | Bachelor of Arts - Journalism<br>Bachelor of Arts – New Media<br>Bachelor of Science – Industrial Microbiology |
| Fanshawe/University of Western Ontario | Bachelor of Arts – Media Theory and Production |
| ** Mohawk/McMaster | Bachelor of Technology |
| Seneca/York | Bachelor of Arts – Creative Advertising |
| Sheridan/York | Bachelor of Design |
| Sheridan/Brock | Bachelor of Computing and Network Communications |
| ** Sheridan/University of Toronto Mississauga | Bachelor of Arts – Art and Art History<br>Bachelor of Arts – Communication, Culture and Information Technology |

## Post Diploma Programs (1 or 2 year)

Colleges also offer Post Diploma programs that are of relatively short duration, to people who have already obtained a college diploma or university degree, and who wish to obtain further occupation or technology specific training.[20]

*Post Diploma Programs in Selected Creative Class Occupations:*

| | |
|---|---|
| Fanshawe | Advanced Film-making<br>Advanced Multimedia |
| George Brown | Advanced Digital Design<br>Digital Game Design<br>** Institute Without Borders |
| Humber | Correspondence Program for Creative Writing<br>Creative Book Publishing |

[20] For a complete listing of post-diploma programs see www.utsc.utoronto.ca/~career/postdiploma.htm

| | |
|---|---|
| | Comic Scriptwriting |
| Seneca | ** Bioinformatics<br>Computer Engineering Technology |
| Sheridan | Advanced Television and Film<br>Computer Animation<br>Interactive Multimedia |

## Conclusions

Drawing from measures of occupational creativity outlined in the creative class literature, this analysis examined the contribution of Ontario's community colleges to the education and training of workers in the two broad creative occupational categories of Arts, Design, and Entertainment, and Science and Engineering. The comparative analysis of aggregate data on income and student mobility in colleges and universities for these two occupational categories indicated that college graduates in some creative occupations earn as much or more as their university counterparts, and that colleges provide important career pathways not only for college graduates wishing to continue their studies at university, but also for university graduates wishing to improve their employment prospects through the acquisition of post graduate technical skills and credentials. These findings suggest that common assumptions about the occupations, income and educational attainment of college graduates obscures a more accurate understanding of the contribution of community college activities to the creative economy. A brief overview of programs in selected occupations indicated that colleges offer a depth and range of training and education programs that universities often do not. In fact, colleges may make an even greater contribution than universities in some creative class occupations such as contemporary music production, industrial design, and digital media, because they produce highly educated graduates with four year bachelor's degrees, who have both theoretical and applied knowledge of new, industry-specific technologies that may make them more readily employable.[21]

This paper has argued that community colleges make critical contributions to the education and training of 'creative' workers for the Ontario economy, and therefore, that college activities deserve increased analytical, empirical, and policy attention. It became evident over the course of this analysis that the data available on college activities is limited. Nonetheless, the evidence presented here is sufficient to suggest that it is inaccurate to overlook the contributions of colleges to the 'creative economy'. In this context, there are several areas for

[21] Again, comparative data on the relative technical skills and employability of college and university graduates is not readily available and requires further research.

further research that offer significant potential to inform public policy in the area of human capital formation and regional economic development. A major policy preoccupation is the creation, attraction, and retention of highly skilled, educated, and 'creative' people. A particularly fruitful area of research would be to examine the impact of colleges on the creation and retention of talent in different Ontario regions and economic sectors, which could be done in several ways. The analysis of student transfers between colleges and universities outlined in this paper suggests that college graduates who transfer to universities tend to transfer to a university that is geographically proximal to their original college, which may have significant implications for regionally specific talent creation and retention strategies. Another approach would be to examine the impact of linkages between colleges and employers in local labour markets, through co-op and internship programs. Recent work on the role of post-secondary institutions in regional economic development suggests that co-op programs not only provide 'hands-on' training and work experience in particular occupations and technologies, they also provide potential post-graduation employment opportunities for students in their field of study, and recruitment mechanisms for both local and non-local employers (Bramwell and Wolfe 2008). A related research question could examine the linkages between colleges and regionally specific sectors and labour markets. Colleges in particular regions often offer programs of study that are directly related to the primary industrial activity of a region. It would be particularly useful to examine how the career pathways of college graduates lead to employment in high growth, knowledge-intensive, 'creative' industries in different regions in Ontario.

In conclusion, the purpose of this paper was not to provide an exhaustive empirical account of the economic returns of college programs, but rather to make the argument that colleges make critical contributions to the education and training of highly trained and educated workers for the current and future creative age in Ontario. Though these preliminary findings do not yet offer a sufficient basis on which to make sound policy recommendations, they do challenge models of talent creation, attraction and retention that overlook the contributions of community colleges. There is little debate over the critical importance of a highly educated, skilled, and 'talented' work force for Ontario's future economic prosperity in the 'Creative Age'. Colleges are key players in the development of this critical resource. They not only train and educate health care professionals, mechanics, electricians, and a plethora of other skilled occupations critical to the established service economy, they also offer innovative degree programs that train jazz musicians, game developers, multimedia artists, urban designers and engineers for the emerging, and constantly evolving, 'creative economy'. Demands for skilled, talented and creative people to fuel the innovation and creativity that drives regional economic prosperity in the Creative Age are increasing. We need to capitalize on all of our human capital.

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# Appendix A:

# Examples of college programs that provide training in 'creative occupations'

### Applied Bachelor's Programs (4 year)

*Fanshawe College: Bachelor of Applied Technology – Integrated Land Planning Technologies* www.fanshawec.ca/EN/ilp1/program/next.asp

The Applied Bachelor of Arts in Integrated Land Planning Technologies at Fanshawe is an example of a creative class occupation in Design with core elements of urban and regional design and planning, and landscape architecture. It is a four year program, with one mandatory, and a possibility of up to three, paid co-op work terms, that requires six University level OSSD courses for admission. The program is described as

> "a unique blend of landscape design, urban and regional planning, geographic information systems, computer-aided design and graphic presentation. The program integrates traditional design skills with current and emerging analysis and presentation technologies. Students also complete theoretical studies that provide an aesthetic, sociological, economic, ecological, civic, and historical context".

Graduates are qualified for positions in government, such as the Ministry of Natural Resources and conservation authorities, as well as private landscape architectural firms, planning firms and architecture and engineering firms. On the technical side, students are trained in the use of geographic information systems, CAD, 3-D modeling, remote sensing, spatial analysis, and digital imaging and videography for urban design applications. The program was launched in 2003, and graduated its first cohort in the spring of 2008. The Ontario Professional Planners Institute has recently recognized the program as a related degree.

*Humber College: Bachelor of Applied Music – Contemporary Music*
www.degrees.humber.ca/music.htm

The Bachelor of Applied Music in Contemporary Music at Humber is designed to lead to a creative class occupation in Arts and Entertainment. Described as the "only degree of its kind in North America" that focuses on the study and performance of jazz, pop, world music, and R&B, it trains students not only in the areas of performance, composition, and production, but also in business and entrepreneurial skills. Students participate in a 14 week industry placement, and develop a professional portfolio as part of the program requirements. In addition

to core faculty, students have the opportunity to take workshops and clinics from internationally-recognized musicians. The degree prepares graduates for careers as performers, arrangers, composers, songwriters, and producers.

### Joint Bachelor's Degree Programs (4 year)

*Mohawk/McMaster: Bachelor of Technology (B.Tech) Program*
http://btech.mcmastermohawk.ca/

The McMaster/Mohawk collaborative B.Tech program, a particularly successful "flagship" example of college-university collaboration, is an example of a creative class occupation in applied engineering. Building on the successful B.Tech program, which has been offered jointly by both institutions since 1997, the program is targeted to students who want an applied, "hands-on" approach to the study of technology. The four year programs in Automotive and Vehicle Technology, Biotechnology, and Process Automation Technology all lead to a Bachelor of Technology degree from McMaster and a Diploma in Technology from Mohawk.[22] A major focus of these programs is a management education component (7 one-term courses), which prepares graduates to take on supervisory and management responsibilities as they advance in their technical careers. These programs also seek to close the gap between management and technology to address supervisory shortages in technology-intensive enterprises. The program began with approximately 100 full-time equivalent (FTE) students in 2005-2006, and is expected to reach a total of 1,250 by 2013-2014.

The strong linkages between McMaster and Mohawk were built in the mid-1990s between Dr. Mo Elbestawi, Dean of Engineering at McMaster, and Dr. Cheryl Jensen, Dean of Technology at Mohawk. The advantages for students from these collaborative linkages are several: many course instructors come from Mohawk, which provides a program focus on technological applications; the mandatory co-op component coupled with the applications focus makes graduates job-ready; and the college tends to have a "much stronger" network with industry, particularly through the Program Advisory Council made up of local and non-local industry representatives. As the Executive Director, Dr. Art Heidebrecht commented, the McMaster/Mohawk B.Tech program represents an "integrated model", through which students "benefit from the faculty and expertise of both programs". He also commented that the B.Tech program provides an important career pathway for college students which allows those "who don't find their way at the beginning" to obtain a university degree.

*Sheridan/University of Toronto Mississauga: Bachelor of Arts – Communication, Culture, and Information Technology*

[22] Degree completion programs with mandatory co-op components are also available on evenings and weekends for people who already have a college diploma or equivalent, and for foreign-trained engineers and technologists who require Canadian credentials.

www1.sheridaninstitute.ca/programs/0506/pccit/

The Sheridan/UTM Bachelor of Arts in Communication, Culture, and Information Technology (CCIT) is a 'hybrid', or synthetic degree that produces graduates in creative media and design occupations, but is difficult to capture under a single description because it involves elements of several disciplines and occupations. Drawing from a mixture of media and web design, digital media, information technology, and "culture jamming", Mike Jones, Sheridan Professor and Program Coordinator, describes the program as a "mix of multi-media, new media, social media...web-focused media design and internet-culture" and involves learning a variety of digital technologies. Students take approximately one third of their classes at Sheridan where they get "hands-on" applied learning on relevant technologies in the Sheridan labs and using the Sheridan audio-visual facilities. Sheridan has "the facilities, the space, the technology, and the interest" to deliver the applied component of the CCIT program and uses a project-based approach to teaching new media, which "takes time to coordinate and evaluate" but allows students to complete the program with a professional portfolio. There are formal links with local employers through the Program Advisory committee, and though there are no paid co-op components, students have the opportunity to do unpaid internships. The program is loosely structured and many students pursue a Joint Major in CCIT and another academic area such as Art and Art History, English, or Professional Writing. Upon graduation, students receive an honours degree from the University of Toronto, and a Certificate in Digital Communication from Sheridan.

## Post Diploma Programs (1 or 2 year)

*George Brown: Institute Without Boundaries*
www.institutewithoutboundaries.com

The Institute Without Boundaries offers a nine-month interdisciplinary program each year to a small group of students who work as a team to research, design and realize a public research project. Initiated in 2003, the program "delves into the methods and practices of design research, strategy and social innovation". The program is offered by George Brown College in partnership with leading designers and industry. The aim of the program is to "produce a new breed of designer who can articulate possibilities, one who is, in the words of Buckminster Fuller, a 'synthesis of artist, inventor, mechanic, objective economist and evolutionary strategist'." The program accepts strong candidates from diverse fields such as geographers, economists, artists, architects, and journalists who want to become designers. The first project of the Institute, created by the 2003 and 2004 classes, was Massive Change: The Future of Global Design, which resulted in a book and travelling exhibition. The current World House Project, a multi-year initiative, has resulted in the design of a housing system, and the construction of canühome, a demonstration home that is sustainable, intelligent,

universal and affordable. Students engage in a full range of creative work, from research and writing to photography, sketching, and design and production. Graduates from the program find employment in a number of organizations, including not-for-profits, cultural institutions, government and private corporations, or in their own enterprise or consulting services. Recent graduates have secured employment worldwide in organizations such as Doctors without Borders, Art Gallery of Ontario, IDEO in California, Ministry of Culture (Costa Rica), Frog Design (New York) and Bruce Mau Design.

*Seneca: Bioinformatics*
http://bioinformatics.senecac.on.ca/

Human genome projects generate vast amounts of biological data. Bioinformatics is the application of computer technology to the management of biological information, and examines how "raw sequence data from genome sequencing projects can be used to generate information about gene function, protein structure, molecular evolution, drug targets and disease mechanisms". The emerging field of bioinformatics requires individuals with multi-disciplinary backgrounds in both biology and computer science, and the Seneca post diploma program is designed to meet the increased demand for trained Bioinformatics professionals. The vast majority of students (95%) already have a university degree in the life sciences, primarily biochemistry, and take the program to learn the relevant computer skills; the program is located in the same building as the School of Computer Studies. The program provides specific training in the area of Bioinformatics, with a focus on Computer operating systems (Unix, Windows); Programming and scripting (C, Perl, HTML, Java); Data Storage, management and analysis (Oracle, SQL); other computer applications used in this field; Current molecular biology laboratory techniques. The program is directly targeted to the needs of industry through the Program Advisory Committee made up of university and industry representatives, and students conduct individual projects within industry and write formal reports.

## Author Bio

Allison Bramwell is a doctoral student in Political Science at the University of Toronto, who will have completed her PhD by the spring of 2009. She has worked as a Research Associate for the Program on Globalization and Regional Innovation Systems (PROGRIS) at the Munk Centre for International Studies, under the supervision of David Wolfe since 2000. Her dissertation research compares strategic workforce development activities in three Ontario communities.

## Working Paper Series

This working paper is part of the *Ontario in the Creative Age* series, a project we are conducting for the Ontario Government. The project was first announced in the 2008 Ontario Budget Speech, and its purpose is to understand the changing composition of Ontario's economy and workforce, examine historical changes and projected future trends affecting Ontario, and provide recommendations to the Province for ensuring that Ontario's economy and people remain globally competitive and prosperous.

The purpose of the working papers in this series is to engage selected issues related to our report: *Ontario in the Creative Age*. The series will involve a number of releases over the course of the coming months. Each paper has been reviewed for content and edited for clarity by Martin Prosperity Institute staff and affiliates. As working papers, they have not undergone rigorous academic peer review.

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