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A Fine Balance: Supporting Skills and Competency Development

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1. Introduction

In the knowledge-based economy (KBE), a strong education system should produce a citizenry that is equipped with the tools for success: skills, competencies, and knowledge. The role of higher education in the development of the KBE is crucial because institutions are the "creators of, and venues for, cultural and social activity" (OECD, 2007: 39). Around the world, governments are aiming to provide higher education equitably and en masse while ensuring it is both of high quality and of relevance to the labour market. This is a challenge that Ontario, too, faces as it prepares its strategies to enhance the knowledge and skills of its citizens.

This research note is the second of a three-part series that examines international trends in strategies for developing knowledge-based economies[1]. It examines issues pertaining to the development of skills, competencies, and knowledge — areas of focused government attention — and the labour market issues faced by skilled graduates. It draws heavily on the experiences of the United Kingdom, the European Union, and the United States and examines particular fields of government interest in addition to the issues of labour market demand, of skills-matching, and of employer needs. An understanding of these international activities and trends should be of help when Ontario is developing a comprehensive and informed strategy for ensuring students are prepared for the KBE labour market.

This research note is structured in three sections, each covering a major theme in the literature. In the first section, debates on the role of higher education within the knowledge based economy are addressed. The role of government in determining future skills needs is discussed, and international trends toward developing a demand-led rather than a supply-led system are addressed. The second section provides an overview of trends in such government activities designed to produce graduates with specific skill sets and qualifications in Science, Technology, Engineering, and Mathematics (STEM), Creative Competencies, and Middle Skills which many governments consider priority areas. The third section examines skills-matching in the labour market and deals specifically with skills-matching and valued graduate characteristics by examining Ontario data on skills training.

[1] The first report examines policies drawn from the experiences of Switzerland, Germany, and the UK that encourage participation in and pathways to higher education. The third paper in the series examines learning outcomes, mechanisms for assessment, and national qualifications frameworks. The EU provides a case example of initiatives.

2. Skills and Competencies Debates

2.1 Theoretical Issues

Central to the question of how to develop a knowledge-based economy is the need to determine the role of Higher Education in the production of graduates. The manner in which an education system is organized and how it prioritizes certain elements has a strong influence on the outcomes of graduates; for example, whether an education system is focused on general knowledge or on specialized knowledge has an impact on the knowledge that students acquire and therefore on their outcomes in the labour market. Similarly, government values have a major impact on education systems. Some countries are currently engaged in a debate on whether higher education is best suited to a demand-led or a supply-led structure. Another significant issue is how higher education is managing issues of labour market demands. The two primary elements of this are: are institutions producing enough graduates from programs needed in the labour market to meet labour market needs, and, secondly, do graduates from these programs have the appropriate skills and competencies required in the labour market.

2.2 System priorities

A recent study (LEONIE, 2005: 7) examined the drivers of change and the core tensions of modernising education systems. The study identified 10 fundamental issues for many European nations, noting that these issues are being addressed as a matter of national (or provincial) policy and priority (see Figure 1.1). By recognizing similar fundamental issues, Ontario may be able to focus policy development on re-conceptualizing the changing roles and responsibilities of the higher education sector. It is the balance struck between the issues that shape the whole system.

Definitions

Knowledge, skills, and competencies have a variety of definitions. For the purposes of this document, definitions from the European Commission are used:

Knowledge means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories, and practices related to a field of work or study.

Skills means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as *cognitive* (involving the use of logical, intuitive, and creative thinking) or *practical* (involving manual dexterity and the use of methods, materials, tools, and instruments).

Competence means the proven ability to use knowledge, skills, and personal, social, and/ or methodological abilities in work or study situations and in professional and personal development

(European Commission, 2008:11)

Figure 1.1 Issues of Higher Education Modernization

Convergence vs. Context – The search to be bodies of global importance while also serving national or local needs.

Continuity vs. Experimentalism – The resistance of Education and Training (E&T) systems to change versus pro-activity and experimentalism that operates on the basis of "foresight management."

Access vs. Excellence (Quantity vs. Quality) – Addressing the question of whether greater "quantity" in learning systems (more enrolments, more players involved, more learning spaces and options) comes at the expense of educational quality.

Market Dynamics vs. Public Good Values – Whether the massive entry of the private sector actors and market paradigms into E&T that has taken place over the last decades compromises public good values.

Generalization vs. Specialization – Whether E&T providers should continue to increase the specialization of their learning provisions or whether curriculum structure should remain broad and common for all students.

Information vs. Knowledge – In an era of "information overload," will learning be more and more an activity of knowledge management?

Individualism vs. Socialization of Learning – The possibility that new technologies will increase communication among learning communities versus the potential that societal trends such as the increasing fear of diversity could make learning a more and more insulated experience.

Encouraging Traditional Providers vs. Bringing New Actors to drive innovation in Education and Training – Whether traditional E&T providers will be increasingly marginalized or rooted in a society filled with new actors.

More Investment vs. More Efficiency – The call to raise investment (public and private) in education and training is being more and more associated with a pressure to diversify funding sources and an increasing attention on rationalization and performance measurement.

Focus on Young People vs. Re-directing Resources to Adult Learners – With an aging population, should more funding be redirected toward adults and lifelong learning?

Nations around the world are attempting to balance the forces of these alternative approaches to education and aiming to develop coherent and well-rounded education systems that support the enhancement of a prosperous labour force. Issues of generalization versus specialization and information versus knowledge are particularly relevant for this discussion. Generalization and knowledge are usually framed within the context of university education where traditional ideals of exploratory learning are valued. In the case of "college type" education[2], specialization and information have taken centre stage in policies where short directed programs aimed at the labour market are fast becoming a priority for some governments (see section 3.3). Despite this simplistic distinction, the value of all types of knowledge is acknowledged, and the dilemma of incorporating each into all levels of programming is a significant challenge.

Beyond supporting the development of the overall economy, ensuring that members of a society possess certain key skills and competencies is crucial, both for personal fulfillment and development and to ensure

[2] Ontario's college-level programming can be equated with European vocational education and training. While not precisely the same, comparative inferences can be drawn from research in the sector.

employability and active citizenship. Along with adequate training in skills and competencies come the ability to think critically and creatively and the ability to transfer the knowledge gained in one area to the issues and problems of another area. Thus, it is as important that university graduates have both the specialization and the information that will prepare them for the labour market as it is that college graduates acquire broad general knowledge that ensures the transferability of their skills in the workforce.

Fostering the critical thinking and abilities of the next generations in the labour market is a task taken seriously by colleges and universities across the globe. The knowledge, be it general or technical, imparted to and acquired by the students has significant implications for local and national industries and for employers and governments because the overall strength of the economy rests upon the abilities of the labour force.

2.3 Demand-led and supply-led strategies

Overarching trends reveal that many nations are working to develop a demand-led strategy in which the students' choice of programs and discussions with local industry and employers are used by program planners to determine the availability of specific curricula and courses. The countries whose governments have a supply-led strategy (that is, course offerings or participation in certain disciplines have been encouraged or determined by the institutions of government) are beginning to incorporate the more market-driven activities that other countries have adopted. Ontario's strong tradition of college and university autonomy supports a demand-led strategy, which allows higher education institutions to respond to the surrounding economy.

Most governments retain the responsibility for examining the long-term needs of regional economies and, thus, remain an important actor in supporting the participation of students in some areas of need; promoting the development of particular skills; determining, assessing, and accrediting student skills, competencies, and learning outcomes; and designing qualifications frameworks. It is important to recognize that "institutional autonomy coupled with social accountability" are two key features in ensuring that national education systems are responsive to both population and labour market needs (LEONIE, 2005: 10).

2.4 Graduate quantity and quality

Governments around the world examine the long-term needs of regional economies and aim to encourage the development of general competencies as well as specific skill bases in the population. Some governments also seek to determine the fields of study or careers that might be needed in the future labour markets. Admittedly, labour market estimates have often been proven wrong (Noailly et al., 2005; Rudd et al., 2007). However, long-term strategic planning is an important part of policy planning. Attempting to determine where there may be excess supply in some occupations coexisting with

excess demand in others requires a delicate balance. Numerous occupations are currently considered to be in a state of either excess demand or excess supply (HRSDC, 2007). At the governance and policy level, the OECD (2007: 152) suggests that labour market mismatching may be attributed to the following:

- a lack of labour market intelligence and knowledge gaps between higher education institutions/graduates and regional employers
- a possible inadequate cooperation between higher education institutions and employers
- a possible inadequate support for new enterprise

Norrie (2008: 7) is more explicit in offering possible reasons for this friction:

- Skill requirements are not clearly understood.
- Labour markets are slow to signal excess demand or excess supply conditions for specific skills.
- Students do not take labour market conditions into account when making program choices.
- Colleges and universities do not respond to changing application patterns by adjusting program offerings or available spaces.
- Program curricula are poorly designed; teaching methods are inappropriate.

Recognizing these reasons as challenges, there are two basic questions for governments around the world to address:

- Are we producing enough graduates vis-à-vis labour market needs?
- Are we producing graduates who have the right skills and competencies to match employer needs?

The remainder of this report examines these two issues by examining the trends in key fields, and by examining skills-matching between employer needs and graduate characteristics.

3. Key areas of knowledge, skills, and competencies training

Many governments have focused on increasing Science, Technology, Engineering, and Mathematics (STEM) graduates in recent years (OECD, 2008b: 87). These are certainly important areas for governments to prioritize because, according to many sources, the future economy is dependent on innovation traditionally associated with these fields.

Nevertheless, developing the other skills of graduates is also becoming a priority for governments, universities, and colleges — particularly the "creative" competencies associated with some disciplines but also evident in diverse fields. The trend is toward developing creative competencies in ICT, mathematics, and technology, but also seeking to encourage communicative, entrepreneurial, and social skills throughout diverse curricula. Another trend identified is the increased focus on college-level programs, particularly the shorter two-year programs that provide what the USA terms "middle skills."

3.1 Science, Technology, Engineering, and Mathematics (STEM)

Science, Technology, Engineering, and Mathematics (STEM) programs have been on many national agendas over the past decade (OECD, 2008b: 87); many OECD nations have focused on increasing the number of college and university graduates in these subjects (OECD, 2008b: 198). Arguably, science and technology graduates are actively involved in research and development that increases innovation and spurs economic growth (Noailly, 2005). The following section addresses this increased participation in STEM subjects, reviews labour market needs, and discusses the potential mismatch of skills.

3.1.1 Increasing STEM participation

Many nations believe they face a shortage of highly qualified scientists, so they are working to supply labour market needs by increasing the number of graduates. The UK, for example, focused on STEM programs in its 2002 strategic policy document *Set for Success* (Roberts), also referred to as the Roberts Review. The report addressed the supply of and demand for STEM graduates, particularly the disconnect between the decreasing enrolment in mathematics, engineering, and physical sciences and the growing demand from employers in these fields. The report recommended policy initiatives that encourage students to participate in STEM subjects not only in K–12 but also in undergraduate and postgraduate years through to employment.

Implementation of the report's recommendations resulted in increased applications to some degree programs — physical sciences (+5% after a two-year period), physics (+3%), chemistry (+11%), and biology (+12%) (Smith, 2007: 7). At the same time, however, there was a decrease of 23 per cent in applications to mathematics and computer science programs (Smith, 2007: 7). Obviously, secondary students were influenced in their choice of programs, but there was also an effect on students already in the PSE system, which showed an increase in the number of students graduating with STEM degrees. Within the two-year period following the implementation of the Roberts Review, the graduate qualifications conferred on STEM students increased significantly in targeted subjects compared to those graduating in non-STEM subjects (see Table 1).

Table 1. UK Graduate qualifications conferred over 10 years, and since the 2002 Roberts Review strategy

Course	1994/1995	2001/2002	2004/2005	Change % 1995-2005	Change % 2002-2005
Mathematical Sciences	4,069	4,130	5,270	+1%	+28%
Computer Science	8,274	14,300	20,095	+73%	+41%
Physical Sciences	13,440	12,415	12,530	-8%	+1%
Engineering and Technology	22,083	20,285	19,575	-8%	-4%
Biological Sciences	12,375	18,495	27,200	+49%	+47%
All STEM	60,244	69,325	84,670	+16%	+22%
All Subjects	237,798	274,440	306,365	+29%	+12%

(Smith, 2007: 8)

A review of *Set for Success*, titled *STEM Review* (Smith, 2007), engaged with sector stakeholders to reveal that, despite the increase of graduating students in some programs, broader implications of the sudden government push for STEM graduates raised a concern that institutions might have been given too much freedom to modify the syllabus in order to make programs more appealing to students. Although done to encourage enrolments, it may have caused problems because employers were unsure of the level of the students' skill, competency, and knowledge base. So it raised the issue of quality, which might result in distrust of the degree (Smith, 2007).

3.1.2 STEM graduate employability

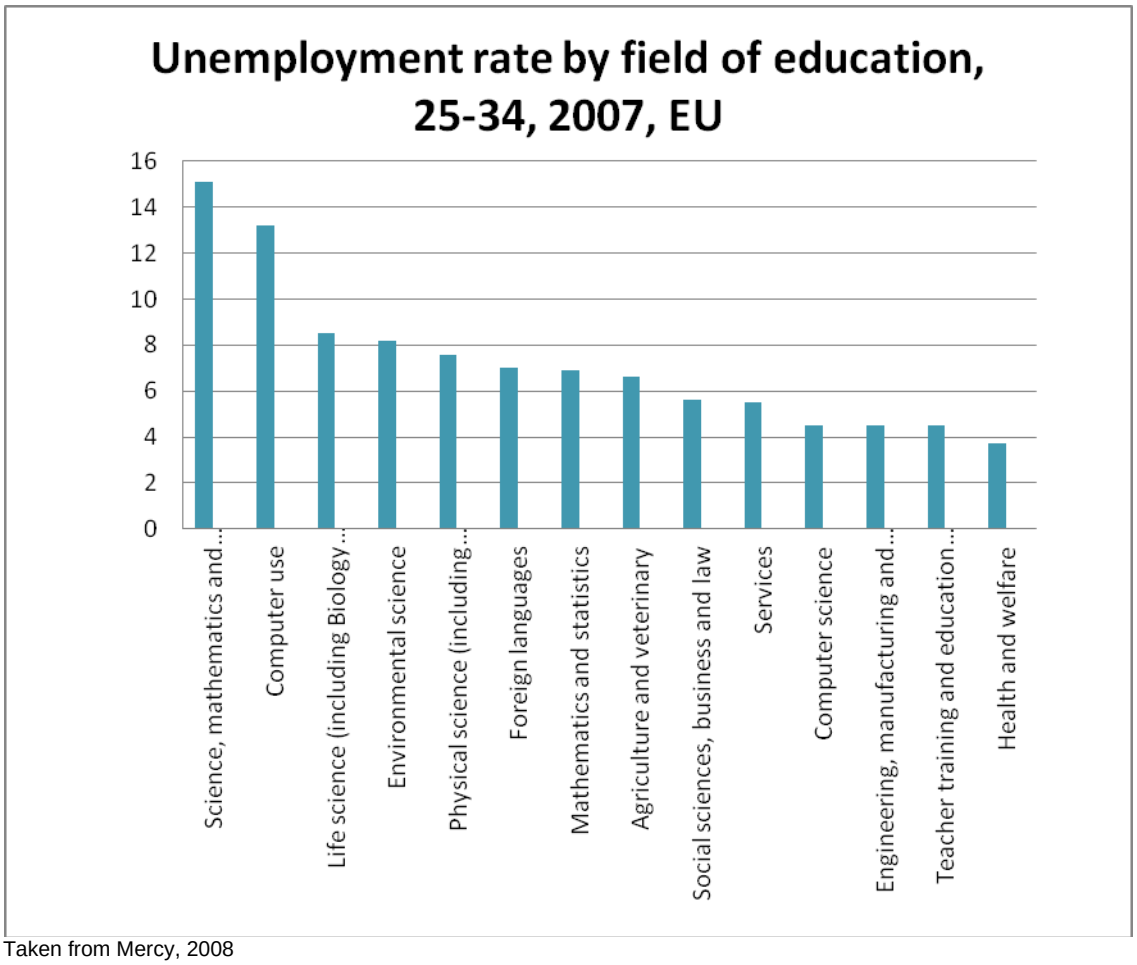
Despite the push by governments to increase STEM graduates to fulfill labour market needs, some research suggests that it is not a shortage of graduates (OECD, 2008a: 198; Noailly, 2005:10). For example, a study in the Netherlands examined a range of labour market indicators including vacancies, unemployment rates, wages, labour market participation, and weekly working hours and did not find a tight labour market for science and technology graduates (Noailly et al., 2005: 10). The findings of the study suggest that internationalization may be an influence on the labour market for science and technology graduates. Arguably, the labour market is more international in these areas than that for graduates in other educational fields, and a mobile workforce keeps wages high in some careers (through international competition for highly skilled individuals) but low in others (a loose labour market for non-experts) (Noailly, 2005: 86–87). Because STEM wages were low, for the most part, they argued that it was a less desirable employment field.

Similarly, other research finds that there may not be a significant labour market demand for new STEM graduates. The OECD suggests it may be attributed to a disconnect between employers' needs and the skills and competencies of graduates:

> "...although labour market indicators do not provide evidence of a shortage of these graduates, the number of science and technology vacancies 'difficult to fill' continued to grow during the period 2003–2006" (OECD, 2008a: 199)

EU research, similarly, shows that science, mathematics, and computing graduates (all combined) are more likely to be unemployed (see Figure 1).

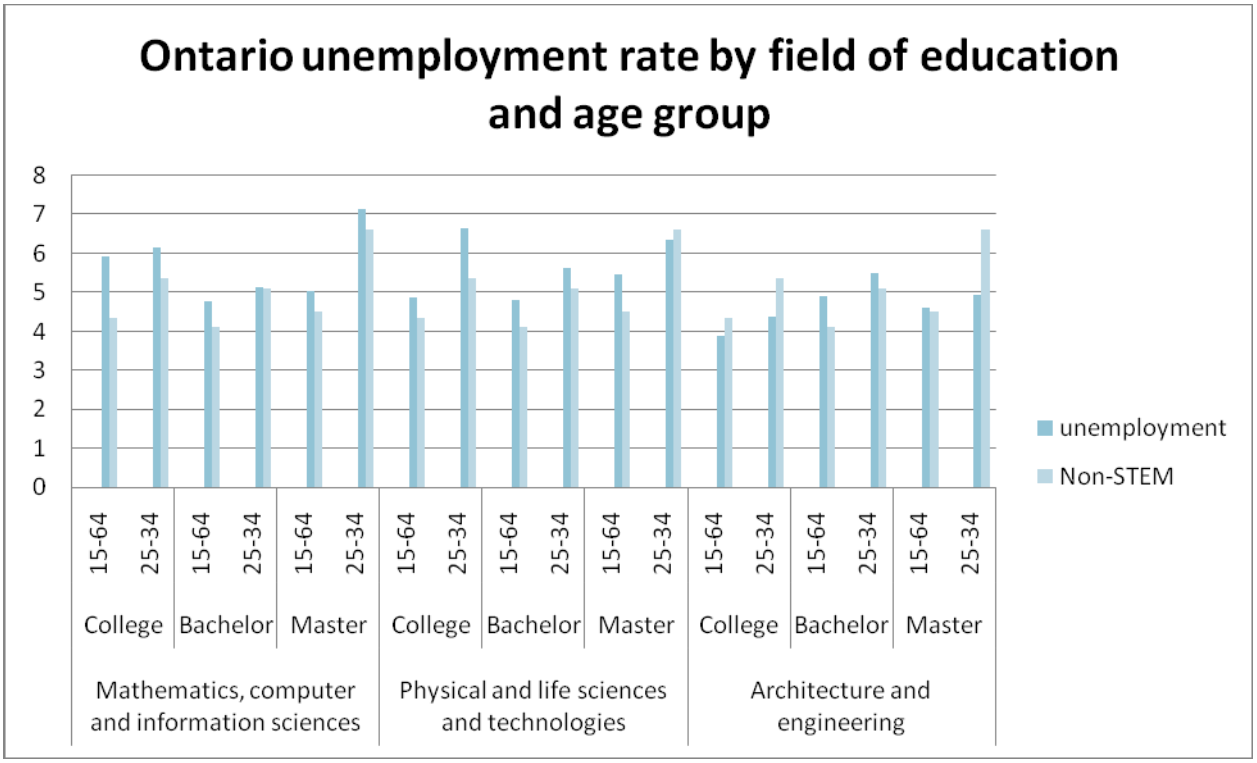
Figure 1. STEM graduates more likely to be unemployed after graduation.



Taken from Mercy, 2008

A 2006 report on Ontario's skills mismatching and over-qualification did not find the same pattern of unemployment (Li et al., 2006); however, the data used in that report were from 1996 to 2001, and the analyst grouped together the science and health professions. Data in the 2006 Census reveal a higher rate of unemployment for STEM graduates (Figure 2). An analysis of variance test shows that, at the college level, being a STEM student has a significant effect on being employed, with the exception of the population aged 25–64. It is quite the opposite for those in a bachelor's program: being a student in a STEM bachelor's program has a significant effect on being unemployed for all age groups. The results for those in a master's program are mixed, showing that being a STEM student has a significant effect on being employed for young people (aged 15–34 and 25–34), but opposite for the whole labour force (aged 15+ and 25–64).

Figure 2. STEM graduates in Ontario are slightly more likely to be unemployed



2006 Census data

Majoring in mathematics generally has a significant effect on being unemployed, with the exceptions of young holders of a bachelor's degree (25–34) and holders of a master's (15–34). The significance level decreases with the more advanced educational level of educational attainment. Overall, majoring in the physical and life sciences also has a significant effect (on 1% level) on being unemployed. Only master's graduates aged 25–

34 have a lower rate of unemployment, but the effect is not significant (on 10% level). At the college level, majoring in architecture and engineering has a significant effect (on 1% level) on being employed for all age groups, while the effect is equally significant on being unemployed on bachelor's level. The effects are not significant for a master's, and can also be significant on being employed for young architecture and engineering graduates with a master's degree.

These data have not yet been further examined to determine the effect of background elements such as actual skill mismatches or general trends in employment and the labour market. Given a possible trend toward unemployment for STEM graduates, it is important to determine whether Ontario is facing a lower demand from employers or whether there is an actual skills mismatch.

3.1.3 STEM Policy Considerations

Despite concerns about a mismatch between labour market needs and the number of STEM graduates, many governments continue to develop policies to increase the number of graduates. A Dutch study (Noailly, 2005: 77–83) of labour market needs examined both supply-side and demand-side policies for increasing research and development. The findings about supply-side policies, which focus on increasing enrolment and graduation rates in science and engineering, include (Noailly, 2005: 88):

- financial incentives such as lower tuition fees
- projects aimed to increase interest in technology such as making R&D or research jobs more attractive
- improve graduation rates in Science and Engineering

However, the research concludes that "supply-side subsidies may leak away if science and engineering students do not graduate or do not enter R&D jobs" (Noailly, 2005: 77). Demand-side policies, primarily providing R&D subsidies to the public and private sphere, were found to be more effective at directly increasing R&D, which is likely to raise the demand for labour, thus increasing wages, ultimately making certain fields a more desirable study choice for students (Noailly, 2005: 89). The research concludes that focusing on increasing STEM graduates or participation in STEM subjects may not be the most effective method of increasing a nation's R&D or innovation.

3.2 Creative Competencies

A recent trend in higher education is the focus on creative competencies that support the development of skills in critical thinking and analysis and innovative problem solving, as well as supporting overall soft skills. Creative competencies have been hailed as the most important feature of a successful economy, providing the talent base in a society that develops innovative businesses and industries thereby securing a region's

economy. The following section addresses the value of creative competencies in the economy, and specifically examines information and communication technologies (ICT), mathematical and technological competencies, communication, entrepreneurship, and social skills as primary targets of activities designed to develop creative competency.

3.2.1 Value of creative competencies

Innovation and creative competencies are not confined to the traditional areas of art, design and entertainment. Rather, they are prevalent in science, technology, research, and business areas alike. Sectors that employ creative competencies play a significant role in the development of employment opportunities, investments, exports, and trade (Bramwell, 2009: 2). Such sectors have been growing at a faster rate than other segments of the economy, and the existence of a creative class of innovators has been quantitatively linked to decreased production costs, improved production sustainability, and value added to GDP (Vinodrai and Gertler, 2006). In the United Kingdom, for example, the creative industries were the fastest growing sector of the economy between 1997 and 2002. They contribute about 8 per cent toward the UK GDP and employ almost 2 million people (OECD, 2007: 172)

The idea of the creative class was popularized by Richard Florida in his book *The Rise of the Creative Class* (Florida, 2002). Subsequently, in the publication *Ontario in the Creative Age*, he and Roger Martin describe the workforce through four distinct classes of occupations (Martin, 2009).

- Creative Class: high-autonomy occupations such as lawyers, doctors, and architects
- Service Class: low-autonomy occupations such as food services, janitors, and secretaries
- Working Class: occupations dependent on physical skills and repetitive activities, such as construction workers or assembly-line workers
- Farming, Forestry, and Fishing

Despite calling one group the creative class, Florida and Martin argue that all classes have the opportunity to become creative in their work (Martin, 2009). To develop the creativity of all individuals, according to this report, educational institutions must increase their emphasis on the development of social intelligence and analytical skills.

To increase the prevalence of creative competencies within an economy, certain skills must be developed and reinforced through postsecondary education and training programs. In 2001, the European Commission's Lisbon Strategy identified the five basic skills necessary for the development of creative competencies within the knowledge-based economy (European Commission, 2003):

- information and communication technologies (ICT)

- mathematical and technological competencies
- communication
- entrepreneurship
- social skills

These skills are not developed in isolation, and it should be noted that these competencies can, and should be, developed across all curricula. The following sections further explain the relevance of each skill for the development of graduates ready to participate in a knowledge-based economy.

3.2.2 Focused areas of creative competency development

Information and communication technologies

Modern ICT graduates operate in a changing business environment where there is a need for greater business awareness and a more holistic understanding of the relationships that occur within firms. The current needs of the ICT student can be grouped as follows (Expert Group on Future Skills Needs, 2009):

- practical experience, flexibility, innovation skills
- management skills for the twenty-first century
- ICT skills
- generic skills

Because of the rapid pace of change within the ICT sector, students must equip themselves not only with current ICT knowledge but also with the soft skills that will allow them to update their knowledge after graduation. Higher education programs should, therefore, include ICT training as well as an entrepreneurial viewpoint so that graduates can not only think innovatively but also present themselves effectively within the business community (Archer and Davidson, 2008: 8).

ICT competencies are important attributes for all graduates, and many employers consider ICT literacy almost as important as general literacy and numeracy for most jobs (OECD, 2008b: 200). Hence, ICT training and information literacy should be an integral part of each program in all curricula. According to Ontario's Key Performance Indicators of college graduates, employers in Ontario are satisfied with the computer skills of recent college graduates (see Table 3).

Mathematical and technological competencies

Mathematical literacy is defined as the ability to use basic mathematics concepts to solve a range of problems in everyday situations. Technological competence is viewed as the understanding of scientific knowledge necessary to modify the natural environment in response to perceived human wants or needs. Competency in both of these areas is crucial for graduates who are entering professions in a knowledge

economy, all of which require analytical and methodological capabilities. Ontario employers, when questioned, report moderate satisfaction with the mathematics skills of their recent college graduates; however, graduates themselves are less satisfied with their mathematics skills training (see Figure 3).

Communication

In a globalized world, communicative skills, cultural sensitivity, and language are increasingly important assets for graduates. As the demand for culturally sensitive employees becomes more prevalent (Archer and Davison, 2008: 5), students who have gained international experience and studied languages beyond their mother tongues are more likely to succeed in the labour market (LEONIE, 2005). One employer stated, "The value of [a student's] international experience goes beyond purely the acquisition of language — it lies in the ability to see business and personal issues from other than your own cultural perspective" (Archer and Davison, 2008).

According to a survey of 233 employers in the UK in 2008, there is an increased demand for students with global perspectives and language skills. The same study shows that graduates are not gaining these competencies at their institutions, evidenced by employers' dissatisfaction with graduates' performances in the workplace (Archer and Davison, 2008: 5). Two initiatives, Erasmus Mundus and Leonardo Da Vinci, are European initiatives encouraging international student and faculty exchanges in universities and Vocational and Education Training (VET) respectively (European Commission 2009a; 2009b). Ontario has a long history of academic exchanges and the 2005 Ministry of Training, Colleges and Universities document *Reaching Higher* set a strategy to increase promote international student exchanges.

Entrepreneurialism

The European Commission's Lisbon Strategy named the promotion of entrepreneurship and the spirit of enterprise as a primary target in 2001. The expert group on Education and Training for Entrepreneurship, also established in 2001, developed a definition of entrepreneurship education that includes two elements (European Commission, 2003: 16):

- A broader concept of education for entrepreneurial attitudes and skills, which involves developing certain personal qualities and is not directly focused at the creation of new businesses
- A more specific concept of training on how to create a business

Whether or not a student chooses to pursue an entrepreneurial path can depend on the innate abilities of an individual as well as the overall socioeconomic environment (ease of establishing a new business, access to finance and advice, and the prevailing cultural attitudes to entrepreneurship). To the contrary, there is research to suggest that innate entrepreneurial abilities can be greatly enhanced by education and training (Richardson and Hynes, 2008: 192).

Entrepreneurship education should not always be considered in isolation or in a generic sense. According to an Irish study, the more successful courses and programs tend to be those that integrate entrepreneurial learning across the general educational experience and that introduce enterprise education into other courses. Other research into entrepreneurial education in Europe suggests that only 20 per cent of graduates surveyed in all program areas indicated their education "provided them with a good basis for developing entrepreneurial skills" (OECD, 2008b: 202). Data from the Ontario Graduate Satisfaction survey of college students indicate that students in business do not find their training to be adequate; however the question of entrepreneurialism is not broadly posed to students within or outside of business programs.

Social Skills

Social skills encompass several competencies: civic, interpersonal, and intercultural. Just as international experience and language acquisition help give graduates a broader understanding of the world, which they bring to the workplace, social skills ensure that graduates can effectively communicate in different public situations and that they possess the ability to respect other individuals and cultures (European Commission, 2004: 17). Social skills require knowledge of one's community and one's nation as well as transnational and international issues. In reviewing the UK employers' top priorities for graduates, 5 of the top 10 important skills were the soft skills of communication, teamwork, integrity, confidence, and character/personality (Archer and Davison, 2008: 7). Similarly, HEQCO-funded research has suggested that emotional intelligence is a strong indicator of academic and on the job success (Bond and Manser, forthcoming).

3.3 Middle Skills

Beyond looking at the broad competencies of graduates, governments are also focusing narrowly on specific programs and types of education. The US, as an example, is focused on the development of individuals for middle-skill jobs, that is, not professionals but quasi-professionals who are trained at the college level for specific careers (OECD, 2008b: 85–89). The US Bureau of Labor Statistics categorizes jobs roughly in three classifications (Holzer and Lerman, 2009: 2):

- high-skill occupations (those in professional, technical and managerial categories)
- middle-skill occupations (those in clerical, sales, construction, installation/repair, production, and transportation/material moving)
- low-skill occupations (those in services and agricultural categories)

3.3.1 Labour market needs

According to a 2009 US labour market forecast, the increasing need for middle-skill occupations will continue. In fact, estimates are that "nearly half (approximately 45%) of all job openings in the next 10 years will be in the broad occupational categories that are mostly middle-skill" (Holzer and Lerman, 2009: 4). Projections suggest that, despite reports that job distribution has become an hourglass where middle-skill occupations are being squeezed out or outsourced, the economy continues to have a robust demand for them, particularly in construction, healthcare, and ICT, among others (Holzer and Lerman, 2007: 4). Occupations such as veterinary technologist, physical therapist assistant, dental hygienist, and environmental science and protection technician are also considered middle-skill jobs that will be in very high demand in the US in the coming years (Goldrick-Rab et al., 2009: 7).

Similarly, human resources in science and technology (HRST) in OECD countries increasingly require individuals with skills that allow them to be part of a research team, but not necessarily the lead researchers (OECD, 2008b: 85–89). These are all occupations that require formal training for advanced manufacturing jobs using high-tech equipment, training that can be acquired in a two-year college degree program. In fact, the report, *Transforming America's Community Colleges* projects that approximately 19 of the 30 occupations with the largest projected growth will require a two-year degree (Goldrick-Rab et al., 2009: 7).

3.3.2 Increasing participation in middle skills training

The US is invested in increasing their middle skills through Skills2Compete. According to their literature, the project is "a non-partisan campaign to ensure our workforce has skills needed to meet business demand, foster innovation, and grow broadly shared prosperity" (Skills2Compete, 2009a). The campaign has hundreds of endorsers ranging from community colleges to union boards and industry leaders (Skills2Compete, 2009b) brought together to press upon the government the importance of two-year degree programs. The overall intention of the campaign is to gain political attention to financially support individuals in their pursuit of a two-year degree.

A policy currently in place is the Train to Gain strategy in the UK. The 2006 national initiative is designed to encourage employers to support the re-skilling of their employees (Learning and Skills Council, 2007). The Train to Gain strategy supports employers in identifying the skill needs of their employees, identifying and sourcing training solutions, financially supporting employee training, and supporting apprenticeships. Level 2 education (high school equivalency) (DirectGov, 2009) is fully subsidized by the government, and partial subsidies are available for level 3 (college

level), apprenticeships, leadership and management, and higher education (when relevant and when funding is available).

The Irish government is also supporting the development of middle skills. In particular, they have developed a strategy to support the unemployed with free Level 3 education (Irish Department of Education and Science). Spaces for 2,500 new students have been opened in such fields as medical devices, biopharmaceuticals, international financial services, and the food sector, which are of importance to the nation (*Irish Times*, 2009).

While a brief review of literature does not reveal that developing middle skills is a primary focus of Ontario policies, it is worth noting the worldwide focus on two-year degrees. It is also important to consider the abilities, opportunities, and limitations of developing curricula within a short period of time. For example, one strategy stemming from the Roberts Review in the UK was the piloting of a two-year accelerated degree in some STEM subjects: observers concluded the model was not feasible because STEM subject areas are too complex to be covered adequately in two years (Smith, 2007: 17). Although two-year degree programs for developing middle skills are valuable, their limitations must be recognized.

3.4 Summary

There are worldwide trends in developing graduates with specific skills, competencies, and knowledge. Nations are focusing attention on developing STEM graduates to fuel innovation, but they are also recognizing the importance of developing creative competencies through all levels and programs. By focusing on ICT, Mathematics and Technology, Communication, Entrepreneurialism, and Social Skills, graduates of all programs should be able to effectively manoeuvre through workplace environments and become productive citizens. Finally, some governments are focusing on providing all citizens with a college education. As the workforce becomes more educated, it is vital to ensure that traditionally under-represented or marginalized groups are given the chance to receive education that will support them in their career goals. Furthermore, the United States forecasts an increased demand for skilled semi-professionals who have completed a two-year degree program in colleges. It is possible that the Ontario labour market sees a similar demand in this area of education and training.

4. Skills-matching for the labour market

Beyond determining what the labour market needs are, providing students with education that gives them the tools to succeed in the labour force is essential for the knowledge-based economy. Their ability to hit the ground running into the workforce is essential for their own labour market success. It is also important to ensure that there are adequate positions for new graduates and that their skills are in demand from

employers and industry. It is this puzzle of skills-matching that many governments are working to solve. In some cases there are not enough graduates with adequate skills to fill employment spaces. In other cases, a soft labour market in some fields creates issues of over-qualification of graduate employees. In other cases, it is a matter of very specific employer needs, despite qualified graduates. In many cases, soft skills and work experience are an issue (OECD, 2008b: 199). Skills-matching affects earnings and work satisfaction, as well as overall productivity in the workplace (Allan and De Weert, 2007: 59). By engaging with local employers and industries, countries are working to determine what the local workforce needs are and attempting to translate those needs into the education system.

Table 2. Top 10 most important skills and capabilities identified by employers when recruiting new graduates

Skill or Capability	% of employers indicating as important
Communication skills	86%
Team working	85%
Integrity	83%
Intellectual ability	81%
Confidence	80%
Character/personality	75%
Planning and organizational skills	74%
Literacy (good writing)	71%
Numeracy (good with numbers)	68%

4.1 International trends in labour market matching

Many OECD countries are currently dealing with skills mismatching. A particular aspect of this is the high level of job opportunities in a specific field coupled with the high level of unemployment in that field (OECD, 2008: 199). The phenomenon of positions that are “difficult to fill” available in a field suggests that employers are not satisfied with the abilities of new graduates and are not finding suitable candidates for vacant positions. Research suggests there is a disconnect between the skills that graduates have and the demands of employers (Archer and Davison, 2008). This occurs in all work environments and with students from all disciplines.

A 2008 UK survey assessed graduate skills by surveying employers to determine what attributes they consider most important (Archer and Davison, 2008).. Small, medium, and large companies were surveyed although there was little discrepancy in their reporting of the top 10 most important skills and capabilities they require of new graduates (see Table 2). Both technical and soft skills are highly ranked.

Despite the consistency in the skills and attributes that most employers desire in new graduates, the same study found a considerable mismatching of employer needs/desires and their satisfaction with new graduates (see Table 3). The skills that employers indicated as important for graduates to have were not always the skills that they were satisfied with in the graduates. When ranking the importance of skills compared to the satisfaction with the skills of graduates, the differences were large. For example, communication skills were ranked as number one in “employers’ most important skills” but ranked 16th in “employer satisfaction with new graduate employee skills.”

Several agencies in the United Kingdom are working to address the problem of skills mismatching through the Learning and Skills Council (LSC). The *National Employers' Skills Survey* (NESS) provides information on the extent, causes, and implications of recruitment problems, skills gaps, and training behaviour in England (2009a). Another initiative is the report *Skills in England*, published annually since 2001; using secondary analysis, researchers synthesize the latest research and analysis into assessing skills needs in the UK (2009b). Apart from government initiatives, *Working Futures 2007–2017* (Warwick, 2009), produced by the Warwick Institute for Employment Research (WIER) at the University of Warwick in Coventry, England, provides employment projections for the UK to individuals, employers, and providers of education and training.

The UK government has been working for a number of years to assess employers' needs and recognizes that there are gap between the training and skills of new graduates and the needs of the labour market. Having the tools to assess the needs of the surrounding economy has revealed specific gaps, which has spurred a number of activities to increase the compatibility of the education programs vis-à-vis employment needs.

Table 3. Employer satisfaction with skills and competencies of new graduates

Skill or Capability	Importance Rank	Satisfaction Rank	Mismatch
Commercial awareness	13	33	-20
Analytical and decision making skills	10	26	-16
Communication skills	1	16	-15
Literacy (good writing)	8	23	-15
Passion	12	25	-13
Relevant work experience	17	30	-13
Planning and organizational skills	7	17	-10
Confidence	5	13	-8
Personal development	21	28	-7

(Archer and Davison, 2008, 10)

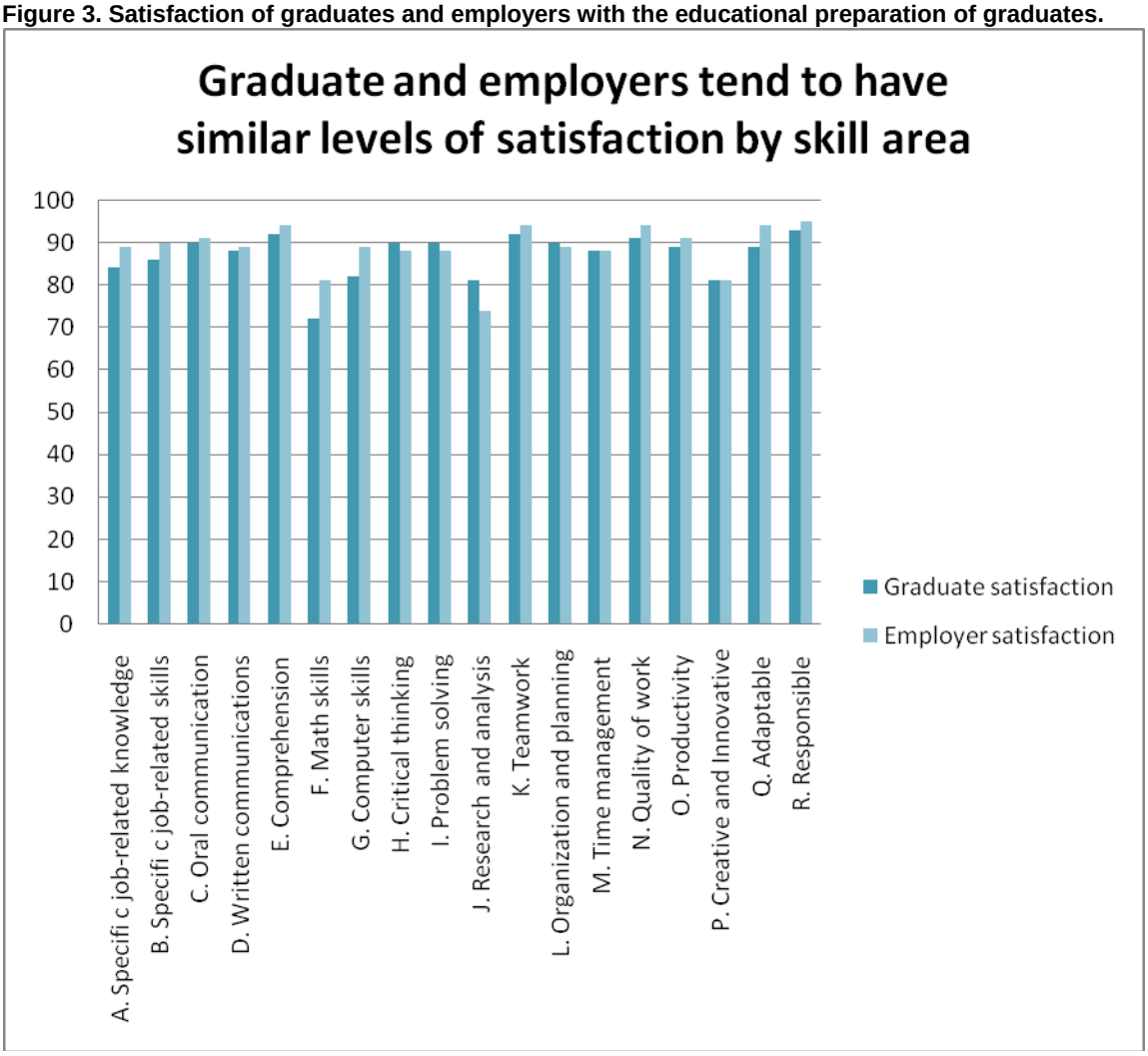
4.2 Ontario trends in labour market matching

Ontario has also made efforts to determine the needs of the labour market and employers and their satisfaction with new graduates. Beginning in the fall of 1998, Colleges Ontario has commissioned its *Graduate Survey and Employer Key*

Performance Indicators (KPI) surveys annually to provide a snapshot of the employment experiences of graduates of Ontario's 24 colleges and their perceptions of the value of their studies in helping them meet their goals after graduation. The three types of KPI surveys — graduate employment, graduate satisfaction, and employer satisfaction — are derived from the colleges' graduate follow-up surveys. The types of information collected from these surveys include socio-demographic characteristics, labour market performance, skills acquired, further education, and learning satisfaction. The 2008 survey indicates that 93.3 per cent of employers were satisfied with how Ontario colleges had prepared their graduates for the workforce (Colleges Ontario, 2008a).

Data from the 2008 KPI survey reveal also that there is a high correlation between employer assessment of skills and training and the students' evaluation of the college education and training they received (Colleges Ontario, 2008b: 68) (see Figure 3). The data suggest that employers are more satisfied with the skills of their newly graduated employees than are the graduates themselves — with the exception of the areas of critical thinking, problem solving, research and analysis, organization and planning in which employers are less satisfied than the students.

Figure 3. Satisfaction of graduates and employers with the educational preparation of graduates.



Colleges Ontario (2008b: 68)

These data are collected on students across all disciplines. It should be noted that there are, on average, considerable differences between the levels of student satisfaction across programs of study. For example, students in Health programs tend to be more satisfied that their job-related skills suit their employment than students in technological programs (McCloy, 2007: 22–24).

There is no comparable survey of employer or graduate satisfaction for universities. An approach taken by Human Resources and Skills Development Canada (HRSDC) uses data from the Census to predict future needs and shortages in the labour market in Canada. However, given the time lag between the collection of the data and the

analysis, it is difficult to predict future labour market fluctuations with any accuracy. According to the HRSDC report, *Looking Ahead: A 10-Year Outlook for the Canadian Labour Market, 2006–2015* published in 2007, there may not currently be strong evidence of imbalances between the broad skill levels demanded by employers and the availability of qualified labour.

At this time, a survey of the employers of recent university graduates would be of significant value in determining how well they are meeting the expectations of the labour market.

4.3 Summary

It is a challenging task to ensure that students receive training in the skills and competencies wanted in the labour market. Employer surveys in the UK highlight the gaps between what the labour market needs from graduates and the skills that the graduates bring to the marketplace. Having uncovered the discrepancy, the UK government has developed strategies to improve the match of skills and qualifications to the needs of the labour market. In Ontario, the graduates of colleges and their employers are fairly well matched in their opinions of student skills. In contrast, no data have yet been collected on the match between the needs of Ontario employers and their satisfaction with graduates of universities.

5. Conclusion

Skills, competencies, and knowledge acquired though higher education serve as the basis for individual success as well as the foundation of a nation's knowledge-based economy. The governments of Ontario, the United States, the United Kingdom, and the European Union are grappling with how best to support the knowledge base of their populations through higher education as well as how best to support their labour markets. They are facing issues of both quality and quantity. The UK government is focusing on efforts to ensure that graduates have what employers are looking for. Their efforts include surveys of employers and working with them to better understand not only the "hard" skills they believe are needed by today's workforce but also the "soft" skills of team work, integrity, character and personality. Revisions of some curriculum areas can respond to the expectation that students will become more commercially aware, more analytical, and that they will develop good communication and literacy skills, and learn to value teamwork, integrity, and character.

Other strategies are being devised to ensure that there are enough qualified people for certain jobs. In particular, governments are supporting areas such as STEM, creative competencies, and middle skills. Despite efforts to maintain the delicate balance between too many and too few qualified individuals in each field, certain positions in each field are harder to fill than others. And the worldwide push for STEM graduates

appears to have resulted in a high unemployment rate for STEM graduates in the UK — and possibly Ontario.

Throughout the EU, the emphasis now is placed on creative competencies, in particular, the development of ICT, mathematics, and technology, communication, entrepreneurialism, and social skills. Although these competencies are not the focus of particular disciplines, they can be infused into the courses and programs in all curriculum areas. Occupations requiring these middle skills are expected to be the fastest growing fields in the coming years, and both the United Kingdom and the United States are providing support to students who enrol in these programs at the college level.

To conclude, in Ontario, the United States, the United Kingdom and other nations in the European Union, the emphasis is on the quality and quantity of activities that can be developed in higher education programs aimed at improving student skills and competencies in order to ensure a capable and prosperous labour force.

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