

**A State of the Field Review of
Post-Secondary Education**

prepared by



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INTRODUCTION

The past two decades have been a period of tremendous flux for post-secondary education (PSE), with the entire system buffeted by the conflicting and competing demands of diverse stakeholders. Governments want to know if public money is being spent effectively, the public wants to know if schools are engaging in teaching and research practices that serve the public interest and the demands of the changing economy, while students and their parents want to know which institution will give them the highest return on their investment.

What follows is a review of the most recent literature on PSE, with an emphasis on the areas of access and learning. The review looks specifically at Canadian post-secondary education, but the lack of good domestic research means that it has been necessary to use a great deal of research from other countries, in particular from the United States.

There are six main sections to the review. We begin with a description of the PSE system in Canada, with the caveat that strictly speaking there is no “Canadian” system at all. Next, we look at the state of institutional governance and accountability, with a special focus on the growing demand for quality measurement and management. The middle three sections survey the literature in areas that are of considerable and widespread interest: Access and retention in PSE, learning outcomes in PSE, and the relationship between teaching and research in the university context. The review concludes with a look at the various final outcomes associated with PSE, in particular labour market, financial and social outcomes.

The balance of our attention is weighted toward the literature on universities. This is largely a function of the limitations of the literature for a number of reasons. To begin with, the Canadian literature on PSE as a whole is not substantial, in particular with respect to learning outcomes. What literature there is focuses almost entirely on the university sector, with simply no relevant published research being done at the college level. The relevant literature from the United States is not helpful because the integrated nature of two-year and four-year institutions does not map well onto the binary college/university distinction that predominates in Canada. In the end, the best we can say is that the college sector in Canada is in need of attention.

Methods

A formal literature review is the main thrust of this project. We have engaged in as thorough a search as we could devise, using standard search methods. The bibliographic details of all potentially relevant papers found through database, hand, Web site, and bibliography searches were entered into a Citation database

Using keyword searches relevant to each section of the review, we searched three electronic databases: The Educational Resource Information Clearinghouse (ERIC), the SocioInfo Index, and the Social Sciences Citation Index. We then conducted a manual search of some three dozen journals -- in the field of education research, policy, and management -- to uncover additional citations. (See Appendix A for the list of journals). Every one of these journals was searched as far back as the year 2000, while the more important journals in the field were searched back ten

years. We also searched the contents of the last fifteen years of the main Canadian journals (The Canadian Journal of Higher Education; The Journal of Distance Education). Bibliographies of papers identified through the above methods were also checked, and relevant papers obtained when possible. In the end, over 200 journal articles, manuscripts, and monographs were retrieved and used in preparing this report.

Presentation of the results

Most of the evidence in this report is presented in a narrative form. That is, the presentation is based on an explanatory analysis of the literature which is presented in a narrative format, following a logical sequence of topics. This is a standard format for a literature review or research synthesis, and is used in many of the most respected field journals, in annual reports, and by many of the standard works in the field, including Pascarella and Terenzini (1991, 2004) and Bowen (1977).

At the same time, we have sometimes found it useful to present quantitative results in the form of meta-analysis. Meta-analysis has certain advantages, in that it allows standardization in the reporting of results, and also allows for easy comparison of data from different studies. A meta-analytic survey begins with the collection of as many relevant studies as possible. (For example, one might find fifty studies measuring the effect of class size on critical thinking skills.) Next, the statistical results from each study need to be translated into a common metric, such as standard deviations, percentile points, or the Pearson correlation coefficient, with the measured effects of each study weighted according to the sample size. This then allows for the calculation of an average effect size based on a weighted average of all relevant studies.

INTRODUCTION

Les vingt dernières années représentent une période mouvementée dans le domaine de l'éducation postsecondaire, l'ensemble du système ayant été déstabilisé par les demandes conflictuelles et contradictoires des divers intervenants. Les gouvernements veulent savoir si les fonds publics sont dépensés efficacement, le public veut savoir si les écoles adoptent des méthodes d'enseignement et de recherche qui servent l'intérêt public et qui répondent aux exigences d'une économie en évolution, et les étudiants et leurs parents veulent connaître l'établissement qui leur donnera le meilleur rendement pour leur investissement.

Dans ce qui suit, la documentation la plus récente sur l'éducation postsecondaire est étudiée en mettant surtout l'accent sur l'accès à l'éducation et sur l'apprentissage. Cette étude se penche concrètement sur l'éducation postsecondaire au Canada. Toutefois, le peu de recherches valables sur le sujet menées au pays nous a obligés à consulter de nombreuses études provenant d'autres pays, notamment des États-Unis.

Le présent document est divisé en six sections principales. Nous commençons par décrire le système de l'enseignement postsecondaire au Canada, bien qu'il n'existe aucun système « canadien » à proprement parler. Ensuite, nous examinons l'état de la gouvernance et de la responsabilisation des établissements en nous attardant en particulier aux exigences croissantes en matière de mesure et de gestion de la qualité. Les trois sections suivantes passent en revue la documentation relevant d'un intérêt considérable et universel : l'accès à l'éducation postsecondaire et le maintien aux études, les résultats découlant de l'enseignement postsecondaire et le lien entre l'enseignement et la recherche en milieu universitaire. Pour terminer, nous examinons divers résultats définitifs associés à l'éducation postsecondaire, notamment ceux touchant le marché du travail ainsi que les résultats économiques et sociaux.

Le reste du document s'attache principalement à examiner la documentation portant sur les universités. Cet aspect relève surtout des limites de la documentation disponible, restriction causée par plusieurs facteurs. D'abord, la documentation canadienne sur l'éducation postsecondaire en général n'est pas très substantielle, particulièrement en ce qui concerne les résultats de l'apprentissage. Ensuite, le peu de documents publiés porte presque entièrement sur le secteur universitaire. En effet, il n'existe aucune recherche publiée pertinente sur le milieu collégial. Les recherches pertinentes provenant des États-Unis ne sont pas très utiles, car la nature intégrée des établissements américains offrant des programmes d'études de deux ans et de quatre ans ne concorde pas avec la réalité binaire canadienne faisant la distinction entre le collège et l'université. Autrement dit, le secteur collégial au Canada a grand besoin d'attention.

Méthodes

Le présent projet vise d'abord et avant tout à faire une analyse documentaire en bonne et due forme. Nous avons entamé une recherche aussi rigoureuse que possible en nous appuyant sur des méthodes standard. Les renseignements bibliographiques de tous les documents potentiellement pertinents trouvés dans des bases de données, sur le Web et au moyen de recherches manuelles et bibliographiques ont été entrés dans une base de données de citations.

En utilisant des mots clés tirés de chacune des sections de l'étude, nous avons effectué nos recherches dans les trois bases de données électroniques suivantes : la *Educational Resource Information Clearinghouse* (ERIC), le *SocioInfo Index* et le *Social Sciences Citation Index*. Nous avons ensuite procédé à des recherches manuelles dans quelque 36 revues appartenant aux domaines de la recherche, des politiques et de la gestion en matière d'éducation afin de recueillir des citations supplémentaires. (Voir l'annexe A pour obtenir la liste des revues consultées.) Pour chacune de ces revues, nous sommes remontés jusqu'aux numéros de l'an 2000; pour les revues les plus importantes du domaine, nous avons même consulté des numéros datant d'il y a 10 ans. Pour les principales revues canadiennes (*The Canadian Journal of Higher Education* et *The Journal of Distance Education*), nous avons même effectué des recherches dans des numéros remontant à 15 ans. En outre, les bibliographies trouvées grâce aux méthodes mentionnées ci-dessus ont été passées en revue et, dans la mesure du possible, nous avons obtenu certains documents pertinents. En somme, nous avons recherché, extrait et utilisé plus de 200 articles de revue, documents manuscrits et monographies pour préparer le présent rapport.

Présentation des résultats

La plupart des preuves du rapport sont présentées sous forme narrative, c'est-à-dire que la présentation se fonde sur une analyse explicative de la documentation présentée sous forme narrative en respectant la suite logique des thèmes abordés. Il s'agit du format standard adopté dans le cadre d'une analyse documentaire ou d'une synthèse de recherche et utilisé dans les revues les plus réputées, les rapports annuels et dans de nombreux autres travaux de notre champ d'expertise, y compris ceux de Pascarella et Terenzini (1991, 2004) et Bowen (1977).

Nous avons cependant jugé utile parfois de présenter des données quantitatives sous forme de méta-analyses. Les méta-analyses comportent certains avantages comme la normalisation de la manière de présenter les résultats tout en permettant de comparer aisément les données de différentes études. Une étude effectuée sous forme de méta-analyse débute par la collecte du plus grand nombre d'études pertinentes possible. (Par exemple, on pourrait trouver 50 études mesurant les répercussions de l'effectif d'une classe sur la pensée critique des étudiants.) Ensuite, les résultats statistiques de chaque étude doivent se traduire en paramètres communs, tels des écarts types, des centiles ou le coefficient de corrélation de Pearson, et les effets mesurés de chaque étude doivent être pondérés selon la taille de l'échantillon. Cette méthode nous permet ensuite de calculer la moyenne de l'ampleur de l'effet en fonction d'une moyenne pondérée des résultats de toutes les études pertinentes.

I. THE POST-SECONDARY EDUCATION SYSTEM IN CANADA

Any description of the Post-secondary Education (PSE) system in Canada must begin with the caveat that there is no real “Canadian” system at all. Constitutionally, education is a provincial responsibility, and each province (and to a lesser extent, each territory) has created its own system of institutions, structures, and policies. There remains very little in the way of a literature offering a comprehensive perspective on PSE in Canada, and what there is tends to focus either exclusively on universities (Cameron 1991) or colleges (Dennison and Gallagher 1986; Dennison 1995). The best single book on the subject remains the collection of essays *Higher Education in Canada* (Jones 1997), which uses the provincial jurisdiction as the basic unit of analysis.

As a whole, the Canadian PSE system combines features of great diversity with substantial homogeneity. In general, all institutions fall into one of two broad categories: degree-granting universities on the one hand, and non-degree granting colleges on the other. Yet as far as this college system is concerned, this binary classification obscures the considerable variation in the role, governance, and type of programming that is associated with the different institutional formats in the different provinces, notably the Quebec CEGEP model (Jones 1997). The validity of the binary classification is further obscured in British Columbia, which in the early 1990s introduced a new concept in Canadian PSE, the “University College.” Established in response to a 1988 report by the Provincial Access Committee, the goal of the University College is to increase accessibility and retention by allowing students to study for a degree without having to move to either Vancouver or Victoria. The best academic work on this experiment-in-progress is by the University of British Columbia’s John Dennison (1992; 1995).

There is currently no standard definition of what constitutes a University (although membership in the Association of Universities and Colleges of Canada is sometimes considered as a defining criteria), and depending on the definition used there are anywhere between 55 and 90 universities in Canada. In a critical survey of the degree accreditation process in Canada, Marshall (2004) argues that the system has become so confusing that we are in dire need of a national accreditation standard. There are also around 250 institutions classified as community colleges, although that sector has been going through rapid and substantial change for the past two decades (Dennison 1995). At the university level, there were more than 800 000 full-time students enrolled in Canada in 2005, with another 265 000 part-time students. Canadian universities employed slightly over 30 000 full-time faculty members in 2001, of which approximately 23 500 were tenured or tenure track. The ratio of male to female faculty is almost exactly 2:1, with 11.1% of faculty members belonging to visible minorities (CAUT 2005).

Early higher education institutions in Canada began as denominational schools organized by various religious groups in the 17th century. Among the universities that still exist today, McGill was founded in 1821, Queen’s in 1840, Toronto in 1849, and Laval in 1852. The period after the Second World War is generally known as a time of colossal expansion of the entire PSE sector, which saw increasing government involvement in both the regulation and funding of higher education, with the secularization of many denominational schools (Massolin 2001; Dennison and Gallagher 1986). Today, almost all Canadian universities are secular institutions established

under provincial legislation. They are autonomous corporations, but are “public” in the sense that they receive the lion’s share of their revenues from provincial operating grants.

Despite the fact that education is a provincial responsibility, and that there is no federal department of education, the federal government has played a major role in the development of higher education in Canada. For the most part, this involvement has been initiated either under the auspices of the prerogatives of the Crown and the federal spending power, or as part of the federal responsibility for research, training, and economic development. Cameron (1991; 1997) provides the best account of the history of the federal perspective on PSE, but misses the substantial developments that occurred starting in 1997 under Jean Chrétien’s Liberal government. This gap in the literature was filled in 2005 with the release of the book-length study, *Canadian Federal Policy and PSE* (Fisher et al 2005), as well as by Cameron (2004).

Cameron (1997) argues that the federal approach to PSE has always been “schizophrenic,” as it has tried to square the political and economic necessity of federal involvement in PSE with constitutional niceties and provincial jealousies. Federal intervention has thus taken indirect and direct forms. Indirect financial support for PSE has historically come in the form of either the transfer of tax points or few- or no-strings cash grants to the provinces. At the same time, direct federal involvement has been in the area of student loans (through the Canada Student Loans Program) and in research, first through the National Research Council and the Canada Council, and later through the three main granting bodies: NSERC, SSHRC, and the MRC.

In the late 1980s, the Conservative government established a National Centres of Excellence (NCE) program, while at the same time trying to wind down the unconditional transfers for PSE and Health that were part of the Established Program Financing (EPF) program that had been in place since 1977. In 1994, the Liberal government proposed to cancel the EPF funding for PSE and replace it with a greatly expanded federal Income Contingent Loan Repayment Plan (ICLRP). The ICLRP plan encountered widespread opposition, and was soon abandoned; but EPF was wound-down and replaced by another block transfer known as the Canada Health and Social Transfer. (Cameron 1997).

After dealing with the fiscal crisis of the mid-‘90s, the federal government began to substantially reinvest in PSE, with a renewed focus (especially with respect to the NCE program) on the applications of new technologies, the commercialization of research, and partnerships with the private sector. This strategy was complimented with the establishment of the Canada Foundation for Innovation (CFI) in 1997 and the Canada Millennium Scholarship Foundation (CMSF) a year later. A series of ambitious programs soon followed, particularly the Canada Research Chairs program (CRC) in 2000. Along with the Canadian Graduate Scholarships (2003) and the Canadian Council on Learning (2004), this was “a series of major initiatives that confirmed the strong commitment of the Liberal administrations to a science policy that placed R and D at the centre of their economic strategy. As the only Canadian federal politician in the modern era to have served a third term as Prime Minister, Chrétien was also conscious of creating a lasting legacy.” (Fisher et al 2005, 87)

The upshot of this is that, since the latter half of the 1990s, the federal government has carved out a place for itself in formulating PSE policy in Canada. The emphasis on research in the

health and applied sciences and its attendant focus on innovation and commercialization has encountered considerable opposition (e.g., Currie and Newson 1998), but as David Cameron argues, the strategy has been successful at “transforming Canadian universities into more innovative institutions... and all the while admitting a growing proportion of Canadians” (Cameron, 2004, p. 21). This is especially true in student financial assistance, where the Government of Canada is now responsible for approximately seventy per cent of all transfers to individuals in respect of post-secondary education in Canada (Usher & Steele, 2006). But, arguably, the increased federal role has come at the price of decreased policy coherence as a whole; Snowdon (2005) argues that while greater funding has been welcome, institutions are now facing a bewildering array of policy incentives which collectively are inducing policy paralysis at Canadian universities.

II. MANAGEMENT AND GOVERNANCE IN POST-SECONDARY EDUCATION

The past two decades have been a period of tremendous flux for universities both in Canada and around the world. Rising enrollment pressure combined with funding cutbacks forced universities to re-examine the efficiency of how they are managed. At the same time, there has been a growing public demand for increased transparency and accountability in the PSE sector, to ensure that both students and the public as a whole are getting value for the money that is going into the sector. Underlying it all are the increased competitive pressures due to “globalization” as universities find themselves trying to reconcile their traditional institutional autonomy with the growing demand for accountability from a diverse set of stakeholders. As Dill (2001) puts it, university presidents

“now find themselves engaged in extensive negotiations with ministries and governments over issues of internal governance, managerial flexibility, and authority for program approval. In turn, the current debates about deregulating publicly funded universities in order to allow them to better compete in their changing environment raises concerns at the government level about appropriate means of sustaining public accountability.” (Dill 2001, p. 22-23)

In this section we look at the recent literature dealing with the internal question of governance and the external issue of accountability. These issues are closely allied with the crucial questions of performance indicators and the measurement and management of quality.

II.A Governance

In the wake of the 1906 Flavelle Royal Commission, Canadian universities adopted a near-uniform governance structure. With the exception of Laval and the University of Toronto, every university has a bicameral system consisting of a Board of Governors, which is responsible for administration and finance, and a Senate, which occupies itself with matters academic. The 1966 Duff-Berdahl report, jointly commissioned by the Canadian Association of University Teachers (CAUT) and the Association of Universities and Colleges of Canada (AUCC) recommended keeping the bicameral model, but made numerous recommendations for making senates more powerful, effective, and democratic. As a result, up to half of all senate positions at most universities are now held by faculty, with some student involvement as well (Cameron 1991). Since 1950, every province except Newfoundland has experimented with coordinating “buffer” bodies to mediate between the universities and the government, although these have been abandoned in British Columbia, Alberta, and Saskatchewan.

The literature on the regulation of PSE distinguishes between *substantive* regulation and *procedural* regulation. Substantive regulation refers to the specified mission of a given institution or sector and the relevant desired outcomes, outputs, and products. Procedural regulation relates to the various means an institution might adopt to fulfill its substantive goals, and includes issues like control over budgets, personnel, contracting out, and general internal management (Berdahl 1998). With respect to procedural regulation, there is considerable

variation within the United States, ranging from the almost complete autonomy of the University of Michigan to the highly centralized management of the public institutions of New York State (Volkwein and Malik 1997). While not as extensive, there is comparable variation in procedural regulation within the EU countries, Canada, and Australia (McDaniel 1996).

To a considerable extent, the response of governments around the world to the challenge of globalization in PSE has been to adopt a policy of “steering from a distance” (Vidovich 2002). This policy combines more tightly controlled and centralized substantive regulation with a great deal of procedural deregulation. In effect, the idea is that governments need to have a clear notion of the outputs they want from the various PSE sectors, but must give the individual institutions considerable flexibility for how they allocate their resources and meet their goals. The rationale for deregulation in PSE is by and large the same as it is in the corporate sector: centralized, top-down management is seen as slow and unwieldy, and in a highly competitive and rapidly changing market it is best to empower those with the most information about the market and the actual service or production processes with the responsibility for making decisions (MacTaggart and Associates 1998; Drucker 1985).

The “steering from a distance” technique has been criticized in the literature on a number of grounds. Dill (2001) argues that it is hard to completely separate substantive from procedural regulation, and that the deregulation of one needs to involve a certain amount of deregulation of the other. In addition, there are worries that centralized substantive regulation prevents institutions from providing the diversity and innovation in programs that the public interest requires (Richardson et al 1999).

Despite the fact that the need for substantial deregulation of university governance has become an almost globally accepted orthodoxy (Hirsch and Weber 2001), it is not clear that governance structures actually matter all that much in determining what decisions are taken at the administrative level. Kaplan (2004) examined the relationship between institutional governance structures and decision-making, and found “few significant relationships between how governance organizes and vests authority, on the one hand, and [decision] outcomes, on the other” (Kaplan 2004, 23).

More specifically, Kaplan looked at whether governance structures that allocated more or less power and participation to faculty resulted in administrative decisions that were, in turn, more or less favourable to faculty. With very minor exceptions, he found that the effects of involving faculty in decisions over finance, academics, and operations were “rather modest.” Furthermore, he found that the *level* at which faculty were involved – department, faculty, senate, union, etc. – had insignificant effects. Kaplan concludes that there is little relationship between the makeup and relative power of governance structures and the decisions the institutions end up taking and implementing (Kaplan 2002). To explain this rather counterintuitive result, Kaplan suggests that institutional culture might trump explicit structural arrangements. This suggestion is supported by the research on retrenchment conducted by Gumport (1993) in the United States, and by Hardy (1996) in Canada.

After the enormous post-war expansion of both enrollment and budgets, in the 1970s the university system in Canada began a two-decade period of fiscal retrenchment. This period was marked initially by declining or stagnating enrollments, but was followed in the 1980s by

increasing enrollment combined with funding cutbacks, and increasing demands from the public for increased accountability. Hardy (1996) is a study of the various strategies adopted by six major universities -- including the University of British Columbia, University of Toronto, and McGill -- to deal with these financial restrictions.

Hardy's argument is that the bureaucratic managerial techniques of centralization, rationalization, and efficiency that many university administrators have been pressured into adopting misunderstand the operation of collegial power within universities. Apart from the more philosophical flaws that managerialism may have (for a popular critique see Ralston Saul 1993; 2005), Hardy argues that it is a one-size-fits-all model that is exceptionally ill-suited to universities. Unlike traditional bureaucratic forms of power, which *enforce* cooperation in pursuit of centrally-planned objectives, collegial power relations *evoke* cooperation through mechanisms of collaboration and consensus, built largely through what she calls "symbolic power."

By examining the actual retrenchment practices at different universities, Hardy shows how varying institutional contexts evoked different strategies. Hardy argues that decision-making in Canadian universities has as its foundation a Professional-Bureaucratic institutional model, in which a number of largely autonomous professional actors find ways of standardizing their skills and techniques and of integrating themselves into a larger bureaucratic structure. Yet on top of this basic *structural* building block, different universities overlay different *decision-making* models. Hardy identifies three such models: the *collegial*, the *political*, and the *anarchic*, and she shows how variations on these three models are instantiated at the different schools she looks at. Hardy's main conclusion is that to understand the governance of Canadian universities, we do not need a general unitary theory of management, but a more nuanced sense of the plurality of institutional contexts and cultures.

II.B Accountability

Along with the changes in regulation and governance, there has been a shift in thinking about accountability. While universities have traditionally been obliged to provide financial statements assuring that spending is in accordance with the purposes allowed by provincial statute, various stakeholders are now demanding greater transparency and disclosure. Governments want to know if public money is being spent effectively, the public wants to know if universities are engaging in research that serves the public interest, and students and their parents want to know which university is going to give them the best value for their time and tuition dollar. Thus, these new demands for accountability arise out of an institutional acknowledgment that universities need to earn the public trust (Kennedy 1997), and out of a public need to know "what the universities are doing, why they are doing it, and whether they are doing it well," (Banks et al 2004).

In a recent survey article on incentives and accountability in PSE in Canada, Michelle Gauthier concludes that the challenge is "to respond to legitimate expectations to account for the use of public funds while avoiding loss of institutional autonomy." (Gauthier 2002, 105) She notes that accountability in Canada occurs at a number of institutional and governmental levels and takes a

variety of forms, including financial audits, board oversight of university administration, university mission statements, and sector-wide strategic plans. For example, in 1999 the Council of Ministers of Education (CMEC) published a report spelling out seven “expectations” for PSE in Canada (CMEC 1999), and in 2002 the federal government released two strategy papers on innovation which included a call for all stakeholder groups to create a plan for achieving national innovation goals (HRDC 2002; Gauthier 2002).

In this new accountability regime, three main approaches have received the most attention in the United States, Europe, and Commonwealth countries: *information disclosure* (or provision), *performance-based funding* (Dill 1997; Cave et al 1997), and *quality process management*. Canada has lagged the rest of the world in all three of these areas, although significant improvements have been made in recent years.

II.B.i Information Disclosure

The most systematic work on the disclosure of financial and non-financial information in PSE in Canada has been done by a team in the School of Business and Economics and Wilfrid Laurier University. It is especially helpful because it looks at accountability and transparency from both a longitudinal and cross-sectional perspective and situates it within the international context.

In a recent survey article, Banks et al (2004) summarise the literature on the state of university accountability in Canada, Australia, New Zealand, and the UK, looking at disclosures of both mandatory and voluntary data. They use an instrument they call the Modified Accountability Disclosure (MAD), which groups twenty six disclosure items into the four categories of *overview*, *service performance*, *financial performance*, and *physical and financial condition*. Each institution’s annual report is examined, and items that are included in the MAD index are given a score between 1 and 5 for quality. Each item in the index is weighted for its relative importance, and given a score of between 1 and 3, based on low, medium, or high importance. Finally, all results are normalized to give a score between 0 and 100 (Banks et al 2004).

This survey found that for every year for which they have data for more than one country, Canada has the lowest score (Nelson et al 2003; Banks et al 1997; Nelson et al 1997). In 1994 for example, the scores were as follows: Canada 16, England, Wales and N. Ireland 19, Scotland 18, Australia 30, New Zealand 85. Yet at the same time, Canadian universities registered significant improvements between 1997 and 2002: In 2002, 23 of the 26 criteria were reported by at least 50 percent of universities. In 1997 only 5 of the 26 criteria were reported by 50% of the universities (Banks et al 2004).

A related study found that the average quantity and quality of disclosures at Canadian universities rose by 187 percent between 1996 and 2000 (Nelson et al 2003) The greatest improvements were found for voluntary non-financial criteria such as student numbers, graduates, faculty, staff, and libraries. Other improvements were found in the reporting of information items such as overhead allocation and unit cost per student, although reporting levels for these remained below 50 per cent of all schools.

Since most of the improvements occurred due to voluntary disclosure (as opposed to changes in mandatory disclosures), it is worth asking, what has motivated this increased transparency. Nelson et al (2003) conducted a series of interviews with university presidents in Canada, and found that most of the improvements in accountability and information reporting were due to external factors. Part of it had to do with changes in government regulations and policies, and partly it was seen as necessary to support fundraising campaigns. But to a large extent, the interviews appeared to confirm that increased transparency was seen as a way of maintaining legitimacy by keeping in touch with the changing needs of stakeholders and the broader community (Nelson et al 2003; Coy et al 2001).

II.B.ii Performance-based funding

The idea behind performance-based funding (PBF) is that some portion of a public university's funding is tied to its performance on certain designated measures (Cave et al 1997). PBF programs have been widely adopted in New Zealand, the UK, and in over half of all US states. Generally, PBF involves a shift from a funding model based on inputs such as enrollment levels or staffing costs to one based on outputs (such as research productivity) or outcomes (such as graduate job placements) (Bruneau and Savage 2002; Burke 1997).

In the early 1990s, many U.S. states adopted an accountability model called Key Performance Indicators (KPIs), although not all of these states actually tie institutional funding to performance on the chosen KPIs. For example, California, New Jersey, and Ohio collect performance indicator data, but publish it only at the system level, not the institutional level. Similarly, the Higher Education Funding Council for England publishes performance data, but does not tie good performance to funding. (Finnie and Usher 2005; Schmidt 2002).

Only recently have Canadian provinces begun to experiment with KPIs. Alberta introduced a Performance Based Funding Mechanism in 1997-98, which has a learning and a research component. Ontario followed suit in 2000-01, introducing three Performance Indicators based on degree completion rate, six month employment rate of graduates, and two-year employment rate of graduates. In both jurisdictions, less than two percent of overall funding is tied to these indicators (Gauthier 2004).

The use of KPIs has been controversial in every jurisdiction in which it has been adopted. Bruneau and Savage (2002) is a detailed and highly skeptical account of the use of KPIs in various jurisdictions. Conlon (2004) and Gauthier (2004) have specifically criticized KPIs in Canada, but their objections are to the perceived ideology underlying the KPI initiative than to the measures themselves. They are seen as part of a more general corporatist/managerialist attempt at importing the values and objectives of the private sector into the university.

In Europe, types of PBF have been largely seen as part of an attempt to come to grips with universities as "hybrid organizations," that need to serve both the state and the market (Mouwen 2000). Orr (2005) writes, "The conundrum facing governments today is to define when and to what extent intervention is appropriate and when the state should step back and leave market components to steer higher education" (Orr 2005). Performance-based funding allows the state to

bring market forces to bear while “steering from a distance” (Vidovich 2002; Leszczensky et al 2004). For Conlon, this is precisely the problem. He argues that PBF is a centralizing move “that makes institutions less responsive to local needs and less efficient in determining strategic plans that make sense for the institution and community in question” (Conlon 2004).

Finnie and Usher (2005) argue that the main objection to KPIs is not ideological as almost no one really has a problem with the idea of funding excellence. Rather, they suggest that the problem is one of measurement, that most KPIs are simply too crude to capture real excellence (most of which are almost simple output measures.) Finnie and Usher argue that equating outputs with “quality” or “success” without considering the nature of inputs (such as funding levels or the nature of the student body) is like ranking hospitals on the basis of the mortality rates of their patients without knowing how healthy their inpatients were to begin with. If KPIs were more subtle and could capture actual “value-added” then they would likely be much more palatable.

II.B.iii Quality Process Management

KPIs have been a largely American phenomenon (though in limited ways they have reached across the border to Canada as well); a reaction, in effect to a fairly loose minimum-standards approach to quality known as “accreditation”. Accreditation procedures, based as they are on laborious qualitative methodologies, are neither simple nor transparent. Performance indicators, crude as they may be, are both of these things – hence their appeal. But neither accreditation nor performance indicators really treat quality in a dynamic fashion. One sets a floor for quality and says whether or not an institution or a program has “passed”; the other simply measures and grades on a curve (and, in instances where performance indicators are tied to funding, proceeds to fund on a curve as well).

An alternate approach to quality management is to look at quality not in terms of outputs but in terms of *processes*. That is to say, if one is looking for quality in an educational institution or programme, one should not look for it in terms of spurious “output” measures” but rather in the processes it uses to continually evaluate and improve its educational efforts. This method of measuring quality, a descendant of the Japanese concept of *kaizen* (continual improvement), made a big impact in North American business in the 1980s, when it was heavily promoted by business guru Tom Peters (1988) and has been enshrined in the concept of ISO 9000. Applied to education, it allows institutions or programmes to set their own goals and their own methods of defining and monitoring quality while the government’s role is to certify that institutions are in fact doing an adequate job of it. While this type of quality assessment may sound less rigorous than the benchmarking approach seen in KPIs, it is in fact a great deal more labour intensive at the institutional level as institutions have to devote significantly more resources to creating and analysing data on their own processes.

Sweden moved explicitly to this model of quality assurance in 1995 (National Agency for Higher Education 2004). In 1998, Australia also moved some way toward this model when it created the Australian Universities Quality Agency (AQUA). Although the AQUA is in some ways a traditional American-style accreditation agency, the AQUA encourages institutions to develop

data in support of their own planning processes and is increasingly concerned with auditing the effectiveness of the universities' quality management process (Emmanuel and Reekie 2004). In 2001, the UK's Quality Assurance Agency (QAA) began to orient itself in this direction as well (QAA 2003). Although there have been no moves towards using continuous improvement techniques at the university level in Canada, some community colleges have embraced the concept wholeheartedly: Columbia College in Calgary, Holland College in Charlottetown and Conestoga College in Southwestern Ontario have all received ISO 9000 certification. (Usher and Finnie 2005).

ISO 9000-like processes are not the only way to use self-study as a way to actively improve quality. Some American and Japanese universities have experimented with Total Quality Management (Yudof and Busch-Vishniac 1996) while "Baldrige" criteria – really an extension of ISO to cover issues such as strategic planning, product development and "teamwork" - have also found adherents (Dodd 2000). These initiatives tend to be undertaken at an institutional rather than a systemic level, and even then they are more likely to be applied to non-academic units than academic ones. None of these have ever been explicitly applied in a jurisdiction-wide manner.

Little, if any, Canadian research has been done on quality improvement processes within PSE institutions. Arguably, this is because Canadian institutions themselves pay little attention to it – at least at the university level. This may be changing, however. As Charbonneau (2005) noted, a multiplication of educational institutional types and the rise of globalization in the academy is putting new pressure on Canadian institutions – which previously had relied on favourable reputations alone.

II.B.iv Quality measurement

Quality measurement is the flipside of quality management. Just as Canadian institutions are facing increasing internal pressures toward quality management, the PSE sector as a whole faces powerful external pressures to provide ways of judging the relative quality of educational institutions. In Canada and other countries, students and their parents have adopted a ruthlessly consumerist approach to the choice of which university to attend, with questions of institutional status, selectivity, and quality increasingly salient for prospective students (Twitchell 2003; Winston 2001).

The growing obsession with quality measurement is reflected in the considerable attention devoted to the institutional rankings or "league tables" (Tight 2000) released annually by many private-sector publications, such as *Maclean's* in Canada, the *Times Higher Education Supplement* in the UK, *Asiaweek* for East and South-east Asia, and of course the *US News & World Report* in the United States. These rankings are hardly uncontroversial (Meredith 2004) and are fraught with concerns over accuracy, accountability, competition, and an intensely political (and somewhat philosophical) debate over the meaning of "quality." What follows is a critical survey of the various schemes for measuring institutional quality.

Pascarella (2001) identifies three strategies for measuring quality (or “excellence”), each of which has certain advantages and disadvantages:

1. *Excellence as reputation and resources*

This is the one most commonly used in the magazine-type rankings mentioned above. It relies on a combination of subjective things such as institutional “reputation” along with a measurement of resources such as endowment, volumes in the library, class sizes, student test scores, and so on.

2. *Excellence as student/alumni outcomes*

This approach infers the quality of an institution on the basis of the learning outcomes of its students or the life outcomes of its graduates. The rationale is that if an institution is of high quality, this will be reflected in things like the cognitive capabilities and career accomplishments of its graduates.

3. *Excellence as effective educational practices*

This approach assesses the extent to which a school makes use of the pedagogical and institutional practices that are known to be correlated with positive cognitive and non-cognitive outcomes. It considers these student experiences -- such as interactions with faculty and peers and exposure to innovative pedagogical techniques -- and suggests that a quality school is one that maximizes student exposure to such experiences.

The main objections to the “reputation and resources” and “student/alumni outcomes” schemes have been well-rehearsed in the literature (see Hossler 2000 and Dichev 2001 for a good account of the problems with the first.) One problem with the reputation and resources model is that it focuses on factors that lend themselves to fairly easy quantitative measurement, but which have been empirically shown to have little impact on learning outcomes (Pascarella and Terenzini 2004). Yet even if factors such as reputation or the standardized test scores of incoming students *were* correlated with positive learning outcomes, this would not help us determine the relative quality of our institutions. All it would do is tell us which schools have a more selective student body, which would be like measuring the quality of a restaurant by the size of the bank accounts of the people who eat there, or by the cost of the kitchen’s cutlery. Commenting on the resources and reputation model, Pascarella suggests that, instead of measuring America’s “best” colleges, “a more accurate, if less marketable, title for their enterprise might be ‘America’s Most Advantaged Colleges’” (Pascarella 2001, 21; Pike 2004)

In contrast, the student/alumni outcomes model faces the same objection but from the obverse. It infers institutional quality from the learning and career outcomes of students, but again fails to consider the impact of student selectivity. Since the best predictor of output is input, it follows that any differences we find in outcomes between institutions will likely be the result of initial differences in their respective student bodies. Furthermore, even if this approach *did* have some validity, there is the problem of how we decide what outcomes to measure. As Pascarella asks, “What particular set of competencies, activities, and accomplishments can actually be attributed to the undergraduate experience?” (Pascarella 2001, 21).

Pascarella, along with his colleagues George Kuh and Gary Pike, ends up arguing for the superiority of the “effective educational practices” model for measuring quality. The main problem with the first two models is that one looks only at inputs, the other only at outputs, but ignores what actually goes on within the schools, treating institutions as black boxes. The strength of the effective practices model, as exemplified by the rating system based on the benchmarks measured by the National Survey on Student Engagement (NSSE), is that it is “designed to assess the extent to which students are engaged in educationally purposeful activities that contribute to their learning and success during college” (Pike 2004, 194). The goal is to open up the black box and evaluate what is actually going on (Kuh and Pascarella 2004).

Finnie and Usher argue that while the effective practices model has certain advantages over the other two models discussed by Pascarella, the NSSE has certain drawbacks. The most obvious flaw is the lack of transparency: While each institution receives its results and those of its peer institutions, these are not made public. Additionally, they stress that the NSSE does not measure learning outcomes, but the widely-supported *correlates* of good learning. Finally, they note that “there does not appear to be any substantial literature linking good ‘learning’ results to future career and life outcomes.” (Finnie and Usher 2005, 14)

A distinctive approach to quality measurement in PSE is the framework built by Finnie and Usher (2005). Like the effective practices (NSSE) model, it aims to remedy the main problems with both the input- and output-based models by opening up the institutional black box and looking at what actually goes on within the university. The Finnie-Usher scheme treats the educational experience as a set of relationships between Beginning Characteristics (the talents, skills, and background that the student brings to the table), Learning Inputs (the elements of the educational experience contributed by the university), Learning Outputs (cognitive outcomes) and Final Outcomes (the “ultimate ends” of education, such as income, career satisfaction, and life happiness).

The aim of this model is to avoid the drawbacks of the effective practices model by explicitly linking effective university practices and institutional resources to positive outcomes while controlling for student characteristics. This enables an examination of the *value-added* provided by the institution, in which “the inputs which have the greatest (positive) effects on the learning outputs will be identified as those which are most important to the ‘quality’ of the educational experience being measured (or its component parts)” (Finnie and Usher 2005, 23).

This model is neutral with respect to values, insofar as the relevant outcomes are defined by the user. “Quality” is thus just a cipher for whatever combinations of inputs are found to be linked to a specified set of outcomes. In reply to objections that this simply sidesteps the very problems the debate over quality measurement was meant to resolve, Finnie and Usher suggest that what their model does is provide a schema for thinking about the value-added of the university experience, *once it has been determined what the objective of a university or college education ought to be*. In doing so, it relegates the political debate to its proper sphere, wherein a workable definition of “quality” depends upon the relevant PSE stakeholders coming to a reasonable consensus on a set of core questions of value.

III. ACCESS AND RETENTION IN POST-SECONDARY EDUCATION

III.A Access to PSE

Part of the problem of looking at something as broad as “Access to Post-Secondary Education” is that the very meaning of the term “access” is itself the subject of a contentious debate.

Traditionally, the term “access” has been defined in two ways, which Anisef (1984) described as Type I and Type II access, but which Drapeau (1990) described using a lifeboat metaphor, with the two key questions being “*how many* people get on the boat?” and “*who* gets on the boat?”

How one approaches the question of access depends crucially on one’s frame of reference. From a supply-side economic point of view, the key access question is usually “how many”, because it relates to the supply of skilled graduates that will emerge from post-secondary institutions. The question of “who goes” becomes essentially irrelevant in this framework as it refers to the *characteristics* of people *entering* post-secondary education rather than the *quantity* of people *emerging* from post-secondary education. Conversely, from the social welfare point of view, the “how many” is often secondary to the question of “who”; the important thing is equality of opportunity rather than the sheer size of the opportunity itself.

Each of these definitions of access clearly requires a different set of metrics. In the “how many” definition of access, more people attending university or college means more access, and fewer people attending means less access. A slightly more sophisticated version of this notion measures access in terms of participation “rates”: i.e., the percentage of all people within a given jurisdiction of a certain age or within a certain age bracket (usually 18-21) who attend university or college. The “who” definition of access is slightly more complicated. Generally, an “accessible” system of PSE is held to mean that everyone has an equal chance to access PSE and that the student body “looks like society at large”. But our understanding of the term “equal access” is in large part determined by the means at our disposal to measure it. For example, in the United States, equal access to post-secondary education is almost always measured by race while in the UK and Ireland, it is measured by social class, using a scale which is effectively based on father’s occupation. In Canada, it is measured by income quartile (comparisons of aboriginal vs. non-aboriginal attainment rates are also frequently made, but race and ethnicity are not systematically used as a means of comparison). Thus policy researchers in Canada, Ireland and England tend to think of “equal access” in terms of class or income while Americans are more likely to think of it in terms of colour.

The pattern of access to post-secondary education is remarkably consistent across countries (see Looker and Lowe 2001 for a review of the Canadian evidence and Andrews 1997 and Vossensteyn 2002 for comparative evidence from other Australia and the Netherlands). Regardless of the tuition or student financial assistance regime in place, aggregate access (the “how many” question) has been increasing throughout the last decade. In all countries, regardless of tuition or student financial assistance regime, significant differences exist between access rates for students from higher income families and lower income families (see Swail 2004, among others for the effects of various changes in tuition policy). Similarly, across

multiracial OECD countries, there tends to be a persistent bias in participation towards “whites” (as opposed to non-white ethnicities, with the partial exception of east Asians, i.e. Japanese and Chinese). Minority linguistic groups, students from rural areas, and students with disabilities tend not to fare so well in terms of participation and aboriginal groups – in countries where they exist – do worst of all. Women’s participation has been rising across all countries, and now exceeds men’s participation in most OECD countries (OECD, 2003).

In Canada, three major policy shifts have occurred in the past decade or so that are worth noting in the context of access policy.

- Tuition has risen at a fairly steady pace of 5% per annum in real terms. Real tuition costs more than doubled between 1990 and 2002. Due to several provinces’ decisions to de-regulate tuition in professional programs, increases in professional program tuition are up by well over 200% and in some cases over 700%.
- Student assistance programs (federal and provincial) underwent a significant dual shift in policy in the mid-1990s. The first shift was to increase the total size of assistance packages while the second was to shift the bulk of assistance away from grants and towards loans. The result was a major increase in average student debt at graduation among university students, from approximately \$10,000 to \$20,000. The trend to higher debt was reversed in the late 1990s as loan limits stayed flat and more grant programs were added at both the federal and provincial levels.
- Entrance requirements to university programs rose noticeably in the mid-1990s. Opinion is divided as to whether this was a natural and overdue reaction to persistent grade inflation at the secondary level or an attempt by institutions to ration places while government funding was being cut back due to overall budget restraints.

In theory, all these measures should hinder access. Programs cost more, students were borrowing more and it became more difficult to get in. And yet, the actual enrolment data did not show any reduction in access. To wit:

- Over time, educational participation has been growing strongly. Over the period 1980-2000, full-time university enrolment has increased from 390,000 to 630,000 while college enrolment has increased from 325,000 to 400,000 (Junor and Usher 2002).
- Females have overtaken males as consumers of post-secondary education and now make up 50% of college enrolment and 55% of university students.
- The rate of growth in participation does not seem to be connected to the rate of increase in tuition fees. University participation is highest in Nova Scotia, where tuition is the highest in the country, and lowest in Quebec, Alberta and British Columbia (Quebec and British Columbia have the lowest and second-lowest tuition levels in the country, respectively, while Alberta’s tuition is among the highest) (Junor and Usher 2004).
- Participation rates at community colleges appear to be relatively equal by family income background (Corak Lipps and Zhao, 2003; Drolet 2005).
- Participation rates at universities are not equal, with participation from the higher income quartiles being substantially higher than from the lower ones. Several surveys have shown a 2-1 gap between university participation rates from the highest income quartile and the lowest income quartile.

- Despite the disparity in university participation rates, there is no evidence that the disparity between the richest and the poorest has widened and there is some evidence that it has lessened. One study (Corak, Lipps and Zhao, 2003) even suggests that the rate of low-income attendance has increased dramatically in the twenty years leading up to 1997, by a factor of nearly four.
- The fate of university students from middle-income backgrounds is the subject of some debate. Some studies (Bouchard, 2000) seem to show that they have been increasing their share while others (Corak, Lipps and Zhao, 2003; Frenette 2005) suggest that they have not fared so well.

In other words, the access picture has been pretty good in Canada. Under the “how many” definition of access, there are some questions about whether or not the country is actually keeping up with demand (AUCC, 2002) but there is considerable growth in the system that is more than keeping up with population changes. Under the “who” definition of access, the situation is not as clear cut but does not seem to have worsened despite the three large policy changes that in theory should be creating access problems.

Yet this is not the popular view of what has been happening in terms of access to post-secondary education. The issue of access to post-secondary education has been a major pre-occupation of governments over the past ten years, ever since the Association of Universities and Colleges of Canada (1997) led a seven-group coalition to warn of the dangers over rising student debt. To that point, knowledge about access to PSE had atrophied somewhat. Despite interesting work done in the late 1960s and early 1970s (Porten, Porter and Blishen 1971), there was virtually no empirical work done on barriers to access from the early 1970s until 2001. Since then, there has been an explosion of literature on the subject, due mostly to a combination of the Canada Millennium Scholarship Foundation’s research program, and a renewed effort by Statistics Canada to look at educational issues.

During the long hiatus of Canadian research on access to education, Canadians tended to rely on results from the United States. In the US, researchers’ preoccupations with respect to access have tended to focus on financial assistance and the “net cost” of education. Methodologically, the main way this has been measured are through a number of studies which look at what is known as “Student Price Response Co-efficients” (SPRC), pioneered by Jackson and Weatherby (1975) and Bishop (1977). The early attempts at SPRC calculations (McPherson 1978, for example) suffered from not including student assistance in their calculations. Leslie and Brinkman (1987) conducted a famous meta-analysis of SPRC studies which partially rectified this problem and concluded that the elasticity of demand was -0.7 per \$100 of net cost increase. Heller (1997), working after a shift in researchers’ analytic framework to include more net price data, updated the Leslie-Brinkman meta-analysis and found that while elasticity of demand was still negative, the coefficient appeared to have dropped below -0.5 per \$100. As a whole, the American SPRC literature can be read in, therefore, one of two ways. Either the elasticity of demand is dropping over time as the returns to education grow larger or there has been no reduction in elasticity and the change in *measured* elasticity stems entirely from improved analytical methods. Either way, it suggests that financial barriers are less important than previously thought in terms of attending post-secondary education. This accords with the observation made by Carneiro and Heckman (2003) which suggests that at most about 8% of

American youth are in some way “credit constrained” in terms of going to PSE. This could be interpreted to mean that student assistance is superfluous, giving money to those who already have it. It could also mean that existing student assistance programs are actually doing their jobs very well.

The lack of a major competitive pricing scheme for education in Canada has meant that most of the research on financial barriers is primarily inferential in nature. Generally speaking it has observed certain things about provincial and federal policies (higher debt, higher tuition) and enrolment (increasing) and concluded that financial barriers are probably not a major barrier (Junor and Usher 2004). In the United States, Heller (1999) has done econometric studies looking at state-level policies using techniques that in theory should be usable in Canada. He finds a negative relationship between tuition and enrolment, but larger studies involving tuition changes and enrolment responses in five countries (Swail 2004), or between private contributions to education and enrolment (Mateju 2003, Usher and Cervenak 2005) finds it harder to make a link between net cost and enrolment. This suggests that the United States, with its massive post-secondary capacity which can expand and contract with demand, may be a very different case than other countries where excess demand means that higher costs don't necessarily mean drops in enrolment.

More recently, Johnson and Rahman (2005) have found that provincial tuition levels seem to have some negative effects on enrolment, if not in absolute terms then at least with respect to trend growth in each province. Their result, however, does not control for provincial spending either on institutions themselves or on student aid. Other people using different data sources have come to similarly weak or inconclusive conclusions; Butlin (1996) and Rivard and Raymond (2004), using the *School Leavers Survey* and the *Youth in Transition Survey*, respectively, find no effect of tuition on participation.

All of this, however, is really still answering how financial barriers alone affect the “how many” definition of access. The equally important question of how financial barriers affect “who” goes to post-secondary education until recently received surprisingly little attention in Canada, not least because of a paucity of empirical evidence on the subject. The natural and automatic assumption has been that problems with student finance are income-related. However, Foley (2002), using data from the early 1990s, noted that there was no statistically significant difference in young people citing financial barriers to PSE by parental education level or by maternal occupation (neither of which is directly a measure of family income but both of which are usually taken as a fairly good proxy for one). Foley did find a significant relationship between parental occupation and citing a financial barrier, but it was in the *opposite* direction to the one expected (respondents whose parents were in professional occupations were significantly *more* likely to cite finances as a barrier than respondents whose parents were in primary or secondary industries). Junor and Usher (2004) used data from the Post-Secondary Education Participation Survey in 2002 to show that, if anything, this phenomenon has intensified over time.

Two Statistics Canada pieces – Corak et al (2003) and Drolet (2005) – make the case that there has been no drop-off in lower-income students over the past decade or so. Corak, in particular, looks at the relationship between tuition, student aid and participation and concludes that the

data suggest that it is availability of loans and grants, not tuition, which most closely affects PSE participation of low-income students. But another article (Coelli 2005), using the same data sources as Drolet, suggests the opposite – that there was in fact a drop in participation among lower income students in the late 1990s and early years of this decade, at least in those provinces where tuition rose the most. Again, the difficulty with these studies is that – with the partial exception of Corak - they take neither provincial funding of institutions nor student aid into account, and hence miss at least two obvious sources of information that could affect access.

To cap it all off, the most complete survey of the Canadian evidence to date (de Broucker 2005) ended up concluding that while financial issues probably play some role in explaining the barriers to education faced by lower-income students, they

...are not the only determinant (of access), nor even the most directly important. Instead, family financial resources blend with parents' education and expectations, geography and institutional capacity to influence educational pathways from very early on.

As a result of these findings, the attention of Canadian researchers has been shifting away from the issue of finances as a barrier to education and towards other causes. Wilms (2003) used PISA data to look at educational attainment in secondary school (as measured by observed prose and quantitative literacy scores) by socio-economic background, and posits that differences between rich and poor in academic achievement may play a major role in explaining the disparity in post-secondary participation rates. Cartwright and Allen (2002) showed that, independent of income, there are differences in teenage literacy rates according to geography, with rural students scoring much lower than urban ones. Butlin (1999) and Bushnik, Barr-Telford and Bussiere (2004) have also highlighted the role of high school attainment in access and persistence in post-secondary education (the term “academic barriers” was subsequently coined as a way to describe this set of non-financial constraints to PSE participation). These studies add to a largely American literature, such as that epitomized by Choy (2002) and Adelman (1999) which focus on high school math skills, in particular, as major determinant of future educational success.

Another literature focuses on information and aspirations of youth. This cannot be separated entirely from the issue of academic performance. Looker and Thyssen (2004) have shown how aspirations for post-secondary education are to a large extent formed by academic performance in the secondary school system. Since students from lower SES families tend to do worse in secondary school, it is perhaps unsurprising that Junor and Usher (2004) found that low-SES youth who do not go on to post-secondary education are substantially more likely than their higher-income counterparts to cite “lack of interest” as a reason for not wishing to pursue PSE.

But this lack of interest may also have to do with different levels of knowledge of the costs and benefits of post-secondary education and also different methods of evaluating the trade-off between costs and benefits. In the United States, Ikenberry & Tuttle (2001) and in Canada, Ipsos-Reid (2001) both show that most of the population significantly overestimates the costs of PSE. Usher (2005) shows this and two other things: first, that accuracy about cost estimates is related to family income, and second, that there is a general *under*-estimation of the benefits of PSE, and

that here too, the accuracy of estimates is related to income (a finding also shown in the US context by Betts 1996, but contradicted – also in the US - by Smith and Powell 1990).

As Manski (1990) points out, the problem with this line of research is that we have virtually no idea how youth form their expectations of future returns. However, Wolf (2002) also notes that while people may not know much about educational choices, this does not necessarily lead them to make irrational consumption decisions. Usher (2005) shows that even though many Canadians implicitly believe that the returns on investment in education are low or occasionally negative (based on answers to questions about estimated costs and benefits), when asked *directly* whether or not university education is a “good investment” over 90% of Canadians reply “yes”. Reconciling low or even negative implicit ROI calculations with a high (90%) approval rating of university as a good investment is not easy using simple “orthodox” financial analysis; it is easier to do if one assumes that what matters is not so much estimated lifetime income but rather the status and quality of life of professions associated with university education.

The best verdict that can be given on the literature about **knowledge or understanding** of costs is that there is definite proof both that people misestimate costs and benefits and that misestimation is inversely related to income, at least in Canada. Theoretically this *should* affect preferences for education, but there is not yet any direct evidence that this is in fact a major deterrent to education, perhaps because Canadians do not view the benefits of post-secondary education as being primarily financial in nature.

There is also the possibility that even if everyone had the same expectations of cost and future income, they might not come to the same decisions about the desirability of undertaking education because individuals’ personal discount rates are heterogeneous. There is, for instance, some evidence that people from low-income backgrounds (and particularly those whose incomes are *unsteady* as opposed to simply low) have different *inter-temporal* preferences - i.e. they have a different investment “horizon” - than people with higher more stable incomes. According to various studies (Lawrance 1991, Becker and Mulligan 1997, Shapiro 1997, Mayer 1997) people with lower income tend to have shorter time horizons, and therefore much higher discount rates. This should make them less likely to be debt averse, but at the same time also less likely to desire any investment in education since the returns on this investment inevitably take time to materialize. Indeed, this is precisely what Vossensteyn (2005) found in the Dutch context, by applying similar psychological constructs to analyzing of student behaviour.

III.B Retention

Although it is a separate problem and has a large separate literature, many of the issues in student retention are the same as those for access, in that many of the same types of people who have a difficult time accessing post-secondary education (e.g. low-income, first-generation and minority students) also have a difficult time completing post-secondary education. Much of the foregoing discussion on access therefore also has some applicability in the field of retention as well.

The work of Vincent Tinto (1975, 1993) is the dominant paradigm in the field. His work stresses the ways in which students’ goals and commitments determine outcomes. The goals and

commitments with which the student enters PSE are to a certain extent shaped by socio-economic factors such as those described above in the section on access. But goals and commitments are also subsequently shaped by the kind of environment provided by the educational institution and by the activities in which the student engages once he or she arrives. If a student finds an institution does not “fit” with his or her needs, then goals and commitment may shift in such a way as to make it more likely that the student will drop out. The resultant model became known as the “student integration model.”

Subsequently, Bean and Metzger (1985) challenged this with a rival “student attrition model”, which put less emphasis on institutional factors and more on social and financial ones. Cabrera et al (1992) did a major study of attrition at a commuter campus in the US Southwest and discovered that the two models each explained roughly the same amount of variance in persistence, which led to a period where researchers tried to integrate the two models and, to some extent, add some extra features of their own (e.g. Sandler 2000).

The Tinto literature has given rise to a reasonably large literature discussing how to apply Tinto’s insights at the level of the institution. Sub-literatures have sprung up to help institutions with “special needs” populations such as minority students (e.g. Swail, Perna and Redd, 2004) and adult students (Ben-Yoseph, Ryan and Benjamin 1999). Some of this literature seeks to attach extra, context-specific struts to the Tinto model; the rest seeks to match the Tinto recommendations with data about what specific types of interventions can help specific types of students.

In the Canadian context, the work of Paul Grayson at York University has been especially important, and his study of the Canadian literature (Grayson and Grayson 2003) is probably the best short overview of the subject. Grayson’s contention is that while there has been a certain amount of empirical work which attempts to document the socio-demographic correlates of drop-outs (which, somewhat predictably, find that the same kinds of groups that face barriers to access also have more difficulty in completing their programs), there has been little useful theoretical work. Of some interest, though, is the finding that American institutional categories (e.g. “commuter campuses”) do not translate well into Canada for the purpose of retention research. More generally, though, the existing research is not very helpful in that results seem to differ significantly from one institutional context to another, making generalizations about both the causes of and solutions to the problem of attrition very difficult.

IV. LEARNING OUTCOMES

IV A. Introduction

Perhaps surprisingly, given the amount of respect accorded to post-secondary education and the billions of dollars – both public and private – that are spent on it, very little is known about learning in post-secondary education, either in Canada, or, arguably, anywhere else in the world. Even in the United States, which has the best data available on this subject, what is known about student learning is inadequate. *Measuring Up* (National Center for Public Policy and Higher Education, 2000), a state-by-state report card on higher education, graded each state on five performance indicators: participation, preparation, affordability, completion, and benefits. On a sixth indicator, student learning, every state was assigned an “incomplete.” As the authors of the report explained:

How much and what students learn in college is perhaps the most important criterion for measuring success in higher education. Despite assessment activities in many states, however, there are currently no common benchmarks for student learning that would allow meaningful state-to-state comparisons. The Incomplete grade highlights a gap in our ability as a nation to say something meaningful about what students learn in college.

It is virtually impossible, in discussing studies of learning in post-secondary education, to proceed without reference to the monumental works of Ernest Pascarella and Patrick Terenzini. Together, in 1991 they published *How College Affects Students*, which reviewed the results of over 2,600 studies on the effects of college on a variety of aspects of student development and life choices (it should be noted here that although “college” is used in the American sense of including both two- and four-year institutions, almost all of this research has occurred in the four-year sector; there is almost no extant research on the effects of community college on learning). In 2004, the two returned to their subject and summarized well over a thousand new articles produced between 1989 and 2002. In addition to the standard narrative literature review, Pascarella and Terenzini perform statistical meta-analyses of certain bodies of literature where multiple small-scale studies have been done. These meta-analyses, are a very useful and accurate way of summarizing the results of an enormous body of literature.

PSE offers many potential benefits aside from the acquisition of various types of knowledge and cognitive skills. There are more personal outcomes such as social and moral growth, aesthetic and cultural development, and of course employment and earning opportunities. Our analysis in this section, however, will focus on the cognitive-psychological changes brought about by the post-secondary experience. This includes two separate types of learning. First, there is the acquisition of specific subject matter knowledge, and of specific academic skills such as verbal and mathematical competencies. Second, there is the development and acquisition of general cognitive competencies and reasoning skills, which can be seen as having applicability over a wide range of content. Commonly referred to as “critical thinking” skills, they enable the student to communicate effectively, reason objectively, evaluate arguments and data, draw inferences, and make reasonable judgments in the face of uncertainty or incomplete information.

IV.B *Limitations in the Measurement of Learning*

Before examining the literature on learning in PSE, it is worthwhile to keep in mind two key limitations of the literature.

First, virtually all of the literature examines *relative* effects and not absolute effects. That is to say that the literature deals with the learning outcomes of one group of students, as compared with either other students (in different cohorts, different programmes, different institutions, and so on) or with people who did not go to college or university at all. The literature says virtually nothing about *absolute* levels of achievement, with respect to literacy, numeracy, critical thinking, or any other learning outcome. A 1995 study on literacy by the Educational Testing Service in the United States found that while university graduates had higher levels of literacy than those who had only some PSE (but no diploma), and that those who had some PSE had higher levels of literacy than those who had no exposure to PSE, the absolute performance of graduates ranged “from a lot less than impressive to mediocre to near alarming” (Barton and Lapointe 1995). Ideally, researchers and policymakers should not simply be concerned at how much change has occurred during PSE; they should also be concerned at how students are doing against absolute criteria of performance. This is an area in which there is virtually no data, and Pascarella and Terenzini (2004) rightly point out that this is an important avenue for future research and investigation.

Second, even when discussing relative effects, one comes up against a fairly serious empirical problem in terms of measurement. In order to determine effects, one must have a reliable method of measuring learning outcomes. There are four basic ways of measuring these learning outcomes. The measuring instrument can be either direct or indirect, and it can rely on either objective or subjective evidence. Direct objective measures include the acquired knowledge and skills as assessed by standardised tests such as the GRE (Graduate Record Examination) and the CBASE (College Basic Academic Subjects Examination). Indirect objective measures use things such as grade point averages as proxies for learning outcomes. Direct subjective measures of learning take the form of individual self-reports of gains in specific types of academic knowledge and skills. Finally, there are indirect subjective measures, such as NSSE, which look for correlations between positive learning outcomes and the experiences that students report as having had while in PSE.

Ideally, one could simply rely on studies that use objective forms of measurement, either in the form of standardised tests or subjective reports of learning. Unfortunately, however, many studies have chosen to use grades or grade point averages (GPAs) as a proxy for learning outcomes, which is unfortunate since these are – at best – an indirect measure of learning. This defect further reduces the number of reliable studies that can be said to shed light on the question of learning in higher education.

IV. C. *Results*

The evidence on learning is presented in three sections. Section (i) follows the schema from Pascarella and Terenzini (2004), looking at the evidence for learning outcomes under the following categories:

- Change during PSE
- Net effect of PSE
- Between-institution effects
- Within-institution effects
- Conditional effects
- Long-term effects

Because of their considerable importance, we present the evidence for the effects of differing pedagogical approaches and the effects of the use of computers and distance education in the two sections that follow, (ii) and (iii).

IV.C (i) Subject matter competence, cognitive skills, and intellectual growth. 1

IV.C.(i) a. Change during PSE

Over the past five decades, research has consistently demonstrated that students make significant gains, during their years in PSE, in subject matter learning and academic skills development. Pascarella and Terenzini (1991) looked at 17 major studies done between 1934 and 1981 that estimated these gains, as measured by various standardized tests. They concluded that their “best estimate” of freshman to senior improvements – that is, senior-year improvements over first-year competencies -- was .56 of a standard deviation for verbal skills, .24 for quantitative skills, and .87 in subject matter knowledge. When described in terms of percentile scores, these numbers give an effect size of 21 percentile points for verbal skills, 9.5 percentile points for quantitative skills, and 30.8 percentile points for subject matter knowledge. So for example, if the average score on a standardised verbal skills test for entering students put them in the 60th percentile (of all those who have taken the test) by graduation those students are scoring, on average, in the 81st percentile.

Since 1989 there have been two minor studies in this area, one by Thorndike and Andrieu-Parker (1992), and another by Underwood et al (1996), neither of which offered much in the way of generalizable results because they were single-institution studies with small sample sizes (197 students in the former, 41 in the latter). More useful is a cross-sectional study by Osterlind

¹ Following Pascarella and Terenzini (2004) we distinguish between gains made in areas of subject matter learning and academic skills which are *specifically* tied to an academic program (on the one hand), and more *general* cognitive development and cognitive skills not directly tied to a particular course of study. The specific outcomes are measured by tests such as the Graduate Record Examination (GRE) and the College Basic Academic Subjects Examination (CBASE). The general cognitive outcomes are referred to by a number of names, including “critical thinking” and “reflective judgment,” but what they have in common is a much more general applicability, measured by tests like the California Critical Thinking Skills Test (CCST) and the Watson-Glaser Critical Thinking Appraisal.

(1997), which administered the CBASE to 75 000 students in 56 post-secondary institutions spread out across 13 states. In this study, freshman to senior gains on CBASE scores were as follows (expressed in standard deviations, with equivalent percentile points in brackets): .77 (28) in English, .55 (21) in math, .62 (23) in science, .73 (27) in social sciences, .80 (29) in liberal arts.

An interesting result involves the pattern or timing of these changes in general skills acquisition. Using the data reported in Osterlind (1997), Pascarella and Terenzini (2004) conclude that a substantial proportion of these gains is achieved in first two years of university. Indeed, the estimated advantages of sophomores over freshmen on the CBASE English, science, and social studies tests accounted for 86%, 94%, and 82% of the corresponding advantages of seniors over freshmen on the same tests.

One possible explanation for why this is so is that nearly all the gains in general skills are concentrated in the first two years of PSE. It is the early, introductory courses that teach the more general subject skills and bits of knowledge that are measured by standardized tests. After second year, students take more focused courses in which they pick up the “discipline-specific” skills which cannot easily be captured by standardized tests.

It is not only in subject matter learning and academic skills that students make significant gains during their years in PSE. Virtually every study indicates that general critical thinking skills increase with exposure to PSE, as measured by standardized tests such as the California Critical Thinking Skills Test (CCTS) or the Watson-Glaser Critical Thinking Appraisal. In their 1991 evaluation of the data on critical thinking skills, Pascarella and Terenzini found a large and extensive body of evidence that suggested freshman to senior gains that ranged from .33 of a standard deviation (13 percentile points) on abstract reasoning, .60 (23) on oral communication, and 1 standard deviation (34 percentile points) on critical thinking. They found relatively few new studies conducted in the 1990s, but the ones they did uncover indicated substantially lower gains of .50 (19). They offer no explanation for the discrepancy.

The most extensive recent study is Facione (1997), who administered the CCTST to 6000 nursing students from 50 separate programmes throughout the United States. He found that the advantage of seniors over freshmen was .54 of a standard deviation (21 percentile points), with 63% of that gain happening by the second year of college. In general, these findings are supported by other studies (especially Beck, Bennett, et al 1992), which found that the advantage of seniors over freshmen is between .55 and .65 standard deviations, or between 21 and 24 percentile points.

IV.C.(i)b. Net effects of PSE

Though it is easily demonstrated that students leave post-secondary education with greater knowledge and better skills than when they entered, it does not necessarily follow that the improvement in knowledge and skills actually occurs *because* of post-secondary education. Valid longitudinal studies which measure the learning impact of post-secondary education require the presence of a control group of similar individuals who have little or no exposure to

PSE. Cross-sectional studies that take a snapshot of a sample of the university population at a single point in time run the very significant risk of reporting changes that could actually describe cohorts that differ in ability or motivation. Additionally, much of the change that occurs during the college years might simply be due to the effects of maturation. Studies that try to control for all of these potential confounding influences are complex, and require the use of sophisticated statistical controls.

Few studies have examined the question of the net effects of PSE with any degree of sophistication. In the 1990s, two studies that looked directly at the net effects of college on subject-matter learning are Flowers et al (1999) and Myerson et al (1998). The first is a statistically controlled analysis of a subset of the large dataset analyzed in Osterlind (1997; discussed in the previous section). The second analyzed data from the National Longitudinal Study of Youth, which measured the net impact of PSE on scores on the Armed Forces Qualification Test (AFQT).

Summarising the findings from these studies, Pascarella and Terenzini (2004) found that the net effect of a Bachelor of Arts degree on verbal and quantitative skills was .25 of a standard deviation, or 10 percentile points. They also found net senior advantages over freshmen in the following subject areas: English .59(22); math .32(13); science .47(18); social studies .46(18). Once again, they found that at least 75% of these gains come in the first two years of university.

Turning from subject skills to critical thinking skills, the evidence for the net effect of PSE is broadly consistent in that there are substantial positive results which seem to be concentrated on the first two years of study. Studies by Rykiel (1995) and Pascarella et al (1996) all show student improvement in this area; Pascarella and Terenzini (2004) show the effect to be equivalent to roughly .55 standard deviations, or 20 percentile points over entry-level scores.

A paper by Grayson (1999) reports on a Canadian study aimed at revealing the “value-added” to critical thinking and communication skills by the university experience. The study is based on self-reports of skill levels of entering students compared to graduating students, and it controlled for maturation effects by comparing the skill scores of an adult education faculty at the same university (Atkinson College at York, with an average age of 32) with scores of students in other undergraduate faculties (average age of 21.) He reports average gains in communication skills of 24 percentile points for the first group, and of 11 points for the second, which is consistent with the evidence from the United States.

IV.C.(i) c. Between-institution effects

The unique or net effect of attending different post-secondary institutions is hard to measure for a number of reasons. Primarily, it is because different kinds of institutions recruit and enroll substantially different kinds of students, thus making it difficult to distinguish the socialization effects of a given school from the recruitment effects. A further confounding factor is that students are peripatetic. Many – especially in Alberta and British Columbia where the post-secondary system is designed to encourage mobility between institutions – attend two or more institutions in their undergraduate careers (in the United States, 50% of students attend more

than one school). This makes it difficult to construct surveys that can adequately measure the effects of a single institution.

Nevertheless, it appears that once we introduce appropriate statistical controls, the between-college effects on the acquisition of subject-matter knowledge and academic skills are small and inconsistent. In particular, institutional selectivity appears to have no consistent, discernible, positive impact on learning. There is evidence that certain institutional environments might have an effect, especially those institutions that emphasize scholarship and learning, but even when significant they are quite trivial. Indeed, out of all the studies looked at, Pascarella and Terenzini (2004) report that only three variables had statistically significant, positive (though still quite small) associations with standardized measures of achievement across at least two independent samples. These are frequency of student-faculty interaction, degree of curricular flexibility, and the level of formal education of faculty.

The same also appears to be true in terms of the growth of critical thinking skills, for which little institutional variation is visible, least of all any due to institutional selectivity. This conclusion is based on a number of studies analyzing the data from the 1992-94 National Study on Student Learning (NSSL), which was a federally funded longitudinal investigation of the factors influencing learning, cognitive growth, psychosocial growth, and other college outcomes. These include the study by Doyle et al (1998), and that by Edison, Boyle, and Pascarella (1998). Reporting on these results in *Change* magazine, Pascarella writes that “institutional selectivity had only a very small and statistically non-significant impact on growth in students’ tested critical thinking over a three-year period” (Pascarella 2001, p. 22).

Why have so few institutional differences been found? The main reason could be that aggregation over entire institutions is simply not fine-grained enough to catch the actual educational experience of individual students. Universities are like hospitals, in that there are dozens of different departments offering a hugely diverse set of “treatments,” with considerable variation in funding, resources, departmental culture, ethos, and so on. The upshot is that there is more diversity within schools than there is between them, so the more significant effects should be observed within, not across, institutions.

The one between-college difference that seems to have a significant effect on critical thinking is what might be termed the “institutional environment”. Schools that cultivate a scholarly and critical intellectual environment show small positive effects in terms of learning outcomes, as do those that emphasize faculty/student interaction and faculty concern for student development. That is just to state what would appear to be obvious: the stronger a school’s intellectual emphasis, the greater the growth in intellectual skills. It is worth noting that these characteristics occur *independently* of institutional selectivity.

Serious attempts are now underway to measure the “culture” of various institutions and, over time, to test how different elements of institutional culture affect learning outcomes. Since the late 1990s, this approach has been the focus of the work of George Kuh and his colleagues, centered on the NSSE Institute for Effective Educational Practice at Indiana University Bloomington. The idea behind NSSE – the National Survey of Student Engagement – is that we can use indices of effective educational practice as a proxy for measuring quality in

undergraduate education. Since spring 2000, NSSE has surveyed over 300 000 students at over 600 universities in the United States. Kuh's work has also been influential in Canada, with over 20 institutions now using the NSSE to evaluate their own learning environments.

The NSSE survey asks students to report on the extent to which they are engaged in educational practices that are strongly associated with high levels of learning and personal development, such as active and collaborative forms of learning and student/faculty interaction. Note that NSSE does not measure learning, *per se*; it measures the presence of *correlates* of learning, and even then, it only does so at an institutional level (NSSE cannot, for instance, do the same thing well at a departmental level, and cannot say anything about class-level learning).

IV.C.(i) d. Within-institution effects

Studies of within-institution differences in learning outcomes have principally centred on two sets of controls: field of study and class size. Unsurprisingly, the biggest demonstrated gains in knowledge are field-specific, that is, they occur within the student's major field of study. Beyond that, no consistent patterns have been found that would indicate that academic major has a differential influence on *general* learning or skills acquisition *outside* the major.

There is a large body of evidence showing that there are substantial differences in the way students taking different majors acquire critical thinking skills. The longitudinal study by Lehman and Nisbett (1990) is particularly important here, in indicating that training in different fields of study leads to the development of different sorts of reasoning skills. Thus, over the course of four years of PSE, social science and psychology students made greater gains in statistical reasoning (65% gain) than did humanities majors over the same period of time (25% gain). At the same time, science and humanities students made significant gains in conditional reasoning² skills (63%) while social science and psychology students made essentially no gains at all.

However, while different areas of academic study lead to different reasoning skills, there is no evidence that any given major itself has differential effects on general measures of cognitive development. Also, as with between-institution effects, it is very hard to separate *recruitment* effects from *socialization* effects. That is to say, it is unclear if the differences in skill development are caused by the relevant academic majors, or if it is because students with different skill sets are attracted to majors that differentially reward those skills.

While learning outcome differences between majors appear to show some clear-cut differences, the same cannot be said for studies that measure learning outcomes according to class size. Reviewing the very large literature on this subject in their first book, Pascarella and Terenzini (1991) found that learning occurred equally between large and small classes. However, in their more recent book, they uncovered some consistent evidence that suggested that increasing class size has a significant negative impact on learning (e.g. Biner et al 1997; Keil and Partell 1998).

² Conditional reasoning is a type of reasoning based on the analysis of everyday conditional sentences of the form "if [cause]... then [effect]."

A point to consider here, though, is that of the ten studies that indicated negative impacts, six measured learning indirectly, through course grades. When learning is measured by direct standardized measures, the evidence on the effect of class size is neither clear nor compelling. For example, Zietz and Cochran (1997) did an extensive analysis of data using scores on the standardized TUCE test (the Test for Understanding of College Economics), and they found that class sizes beyond 30 students had a negative influence on post course TUCE scores. Yet another study based on the same data failed to find any negative effect (Kennedy and Siegfried 1997), while two other studies (also using TUCE scores) had inconsistent results (Lopus and Maxwell 1995; Becker and Powers 2001).

IV.C.(i) e. Conditional effects of PSE

“Conditional effects” mean those effects that are not found uniformly across the student population, but instead differ from one type or group of students to another (i.e. between genders, ethnic groups, etc.). The 1990s saw a flourishing of interest in studies aimed at measuring the conditional effects of college. Because every student is unique in at least some way, it would be impossible to make any sweeping claims about the conditional effects of college, since it would be impossible to test for every possible difference.

Gender

Overall, there is little evidence to suggest that PSE in general has a differential effect on the acquisition of critical skills for different kinds of students. In the last dozen years, a number of studies have emerged that seem to show some gender-conditional effects on critical thinking skills, but the majority of these studies are based on single, unreplicated or unreplicable findings. One recent exception is Whitt et al (2003), which found that after three years of PSE, women demonstrated a critical thinking advantage of .20 standard deviations (8 percentile points) compared with men.

When it comes to gender-conditioned effects in more specialized forms of knowledge acquisition, however, one rather interesting result suggests that men are deriving considerably greater learning benefits from PSE than are women. The key study here is Flowers et al (1999) which examined the 56-institution CBASE dataset, and found that “Across all four CBASE tests the average net freshman-senior difference for men was about 1.5 times as large as the corresponding difference for women.” On the individual tests, the ratio of male-to-female differences was as follows: English = 1.27; mathematics = 2.46; science = 1.46; social studies = 1.42.

This is a rather large and startling difference in net effect, and it certainly demands some explanation. One suggestion that has been mooted (Jacobs 1995) is that the math/science difference is largely a function of different coursework patterns, but this does not explain the gender differences in English and social studies. Furthermore, a recent study found that the math/science gender gap persists in the presence of various controls, including those that control for coursework patterns (Whitt et al 2003).

No follow-up research has yet explored this effect, so any explanations are largely speculative. One possibility is that the entire PSE experience is “gendered” in such a way that it is systematically biased against women (Smith, Morrison, and Wolf 1994). It should be emphasized, though, that what is being measured here is differences in gains between sexes. Thus, the measured difference does not mean that one sex leaves PSE with a greater benefit. In fact, it could mean that males, who typically arrive to PSE with lower achievement scores than females, simply make up the difference by the time they leave.³

On the other hand, it may be that men are intellectual “late bloomers” relative to women, and that while girls outperform boys in secondary school, the reverse is true at the PSE level. Given the tremendous importance of this issue and the paucity of sound data, this is something that positively begs for more research.

Race

In terms of content learning, the evidence for learning differences by race or ethnicity is “inconsistent to the point of being contradictory” (Pascarella and Terenzini 2004, p. 136). On the one hand, the study by Myerson et al (1998) found that African-American students in PSE made gains in subject-matter learning that were approximately four times those made by White students. Yet when Flowers (2000) analyzed a pair of multi-institutional data sets using a different set of controls, he found the opposite: African-American students made smaller gains than Whites across a range of standardized tests. Finally, Flowers also found, using the 56-institution CBASE data, that the freshman-senior learning difference across all four CBSE tests was exactly the same for African-Americans and Whites.

With respect to critical thinking skills, the evidence is not large but it would seem that in the United States, overall Blacks and Latinos make smaller gains in critical thinking skills than do Whites. This evidence, which is based on the National Study of Student Learning (NSSL) data, indicates a slight disadvantage of 6 percentile points in the first year, and seven points after three years, for African-American students (Flowers 2000, Terenzini et al 1994). A study at York University in Toronto found considerable variation in PSE experiences from one racial group to another, but concluded that “race per se has only a marginal impact on a couple of outcomes. As a result, at least with regard to the first year experience, there is a considerable degree of racial equality in outcomes.” (Grayson 1995).

Learning style

The most consistent evidence for conditional effects appears with respect to student learning styles. Solid, replicated experimental data showed significantly higher levels of knowledge acquisition when students were exposed to a type of instruction that matched their preferred learning style.

The term “learning style,” is used by researchers to denote “the way each individual begins to concentrate on, process, internalize, and remember new and difficult academic information or skills.” (Dunn and Stevenson 1997). Learning styles are measured by various self-diagnostic

³ We owe the analysis in the paragraph to the anonymous reviewer from CCL.

tests (such as the Learning Style Inventory), which provides a profile of the student's preferred learning style along a number of cognitive, affective, environmental, and instructional dimensions. So for example, some students learn better in small groups, others in large lectures. Some are independent learners with a strong internal locus of direction and control, while others are more conformist learners, taking their cues from instructors and requiring external control and sanction.

The "learning style hypothesis" is that once one has determined a student's preferred learning-style profile, one can tailor instructional approaches to that style, which will result in better learning outcomes. Dunn, Griggs, Olson et al (1995) performed a meta-analysis of 36 experimental studies that were designed to test the learning-style hypothesis. Of these studies, 8 were conducted at the post-secondary level, and the results were striking: Students who received instruction matched to their learning style demonstrated an achievement advantage of nearly a full standard deviation (approximately 32 percentile points) over their counterparts who had no attempt made to provide instruction accommodating their preferred learning style.

"First-Generation" students

In the past few years, there has been some interesting work looking at critical thinking outcomes for "first-generation students," i.e. those students from families where neither parent had more than a high school education. They report "only trivial, chance differences between first-generation and other students" on a whole range of outcomes, including writing skills, reading comprehension, and critical thinking" (Pascarella, Pierson et al 2004, p. 277), although they do note the following conditional effects:

- while first-generation students are less likely than other students to engage in a broad range of extracurricular activities, they derive stronger significant positive benefits on critical thinking and other cognitive skills.
- in contrast, non-academic involvements such as work or athletics had a significantly larger negative impact on first-generation students with respect to critical thinking skills.

A very recent study (Pike and Kuh 2005) examines how the PSE experiences of first- and second-generation students affects their learning and intellectual development. They found that in comparison with students from families where at least one parent had some PSE, first-generation students were less engaged, found the environment less supportive, and reported less progress in learning and intellectual development. Yet in their discussion, Pike and Kuh point out that these inferior outcomes are almost entirely the result of lower educational aspirations and of living off campus, and not due to the immutable characteristic of being born to parents who did not go to college.

"Gifted" Students

To conclude this discussion of the conditional effects of PSE on critical thinking skills, we should note that in a recent Canadian study, Grayson presents a study indicating that graduates of high school gifted programmes have slightly higher self-reported reasoning and problem-solving skills than other students, although this does not manifest itself in higher grades (Grayson 2001).

IV.C.(i) f. Long-term effects of PSE

The most significant long-term effect of PSE is that it makes one more proficient at acquiring new knowledge: students have learned how to learn, and this is an effect that persists long after graduation. Additionally, it gives an increased likelihood of engaging in activities that will continue learning (e.g. regular reading, participating in continuing education) after graduation and throughout one's life.

US Census data from the 1990s show a substantial difference between high school graduates and people with at least a bachelor's degree, on a number of activities. For example, 30.7 percent of high school grads participate in continuing education, while 58.2 percent of BA's do so. Other differences include reading a book in the last six months (57 percent versus 83 percent), reading a daily newspaper (27 percent versus 42 percent) and creative writing (4 percent versus 14 percent). Additionally, college graduates are 1.7 times more likely than high school only graduates to have a library card.

IV.C. (ii) Pedagogical Approaches

There is an extensive literature addressing the learning impacts on learning and cognitive development of various general pedagogical approaches, classroom techniques, and differing teacher and student behaviours. What follows is an account of some of the more interesting and relevant findings.

IV.C. (ii). a) Pedagogical Techniques

The literature on pedagogical techniques can be grouped into a number of distinct approaches. These include

- learning for mastery/personalized system of instruction (LFM/PSI)
- active learning
- collaborative and cooperative learning
- small-group learning
- learning communities

With very few exceptions, these teaching methods have either a positive impact on student learning (when compared with students in classes that do not use these methods) or they have no discernible effect one way or the other. (See *Table 1*, below)

In LFM/PSI, students are paced through the course material one element or unit at a time, and do not move on to the next unit until they have demonstrated sufficient mastery of the current material (Kulik et al 1990). This is in contrast with the more traditional method of following a course plan or syllabus according to the calendar, moving to the next unit when the time allotted for the current one has expired. There are two large meta-analyses of the data on this (Guskey and Pigott 1988; Kulik et al 1990). The former indicates a learning advantage for LFM over

traditional methods of .41 standard deviations (16 percentile points), while the latter reports an advantage of .68 (25).

Active learning is a form of instruction usually opposed to the more traditional lecture-and-listen method which treats the student as a passive learner. Active learning involves things such as group discussion, Q&A sessions, in-class debates, and so on. On the basis of a summary of the considerable literature, Pascarella and Terenzini (2004) estimate an advantage of .25 standard deviations (10 percentile points) for active learning over traditional lecturing. This is consistent with a number of correlational studies (a Canadian study by Grayson 1999; Kuh et al 1997) which rely on student self-reports to measure knowledge acquisition. These studies found that students reported a significantly positive association between active involvement in class and increased learning outcomes.

Collaborative learning is a general term for “a variety of educational approaches involving joint intellectual effort by students, or students and teachers together... There is wide variability in collaborative learning activities, but most centre on the student’s exploration or application of the course material, not simply the teacher’s presentation of it” (Smith and MacGregor 1992, p. 10). The idea is that knowledge is best acquired through social interactions, and the body of evidence indicates that collaborative learning significantly enhances learning outcomes. **Cooperative learning** is a more rigorous form of collaborative learning, in which students work together in small groups to achieve shared learning goals. The large literature on this is summarized in Johnson et al (1998), and it indicates an achievement advantage of .53 standard deviations (20 percentile points) over independent learning techniques.

The leading studies on **small group learning** report an almost identical effect size. Small group learning incorporates elements of collaborative and active learning, and can be used in almost every academic discipline. Springer, Stanne, and Donovan (1999) conducted a meta-analysis of the research on small group learning, and across all studies, found that the learning achievement of small group learners was .51 standard deviations (19 percentile points) greater than students who did not participate in these forms of learning.⁴ A qualitative study of upper-year engineering students by Colbeck et al (2002) looked at the effects of group work on students’ self-reported skills development. They found that *most* students reported that group work enhanced various “professional” skills such as leadership and communication skills. The students interviewed also reported that group work enhanced their “postformal” problem-solving skills, for open-ended types of problems.

Learning communities are made up of students co-enrolled in two or more courses linked by a common theme, in which faculty teaching the common courses structure their teaching and assignments to take advantage of that linkage. Some learning communities involve a residential aspect, where the co-enrolled students live in close physical proximity in order to provide opportunities for out-of-class interactions. To a large extent, learning communities incorporate aspects of active and collaborative learning, and this approach is linked with positive social and academic outcomes such as increased effort, openness to diversity, and social tolerance (Whitt et al, 2001). A recent study on learning communities and student engagement (Zhao and Kuh

⁴ Compare this with the discussion on class sizes and subject matter learning in section IV.C. (ii).D

2004) found that learning communities are uniformly associated with a number of positive learning outcomes, including

- Enhanced academic performance
- Gains in skills, subject competence, and knowledge
- Social experiences
- Satisfaction with the academic experience

Table 1

TYPE OF LEARNING	MAIN STUDIES	EFFECTS
Learning for mastery	Kulik et al (1990); Gusky and Pigott (1988)	Advantage of 16 to 25 percentile points
Active learning	Pascarella and Terenzini (2004); Grayson (1999)	Advantage of 10 percentile points; increased self-reported learning outcomes
Collaborative/cooperative learning	Smith and MacGregor (1992); Johnson et al (1998)	Advantage of 20 percentile points
Small group learning	Springer, Stanne, and Donovan (1999)	Advantage of 19 percentile points; enhanced self-reported critical-thinking skills
Learning communities	Pike (1999); Zhao and Kuh (2004)	Across-the-board increases in self-reported learning outcomes

IV.C. (ii) b) Teacher Behaviour

One of the most-studied topics in PSE research is the question of teacher behaviour. Studies consistently show that teacher preparation and engagement has moderate positive correlations with learning outcomes, especially when it comes to the organization of classes, clarity of lectures and instructions, instructor availability, feedback to students, and similar behaviours. That is to say, the more a teacher is engaged with the class, the material, and the students, the better the learning outcomes. A synthesis by Feldman (1997) produced student achievement correlations of .57 with teacher preparation and organization, and .56 with teacher clarity. Similarly, Schonwetter (1993) argues that instructor expressiveness, clarity, and organization all play an important role in student learning and cognitive development. For example, he cites one study (Hines et al 1985) showing that instructor clarity explains 52% of the variance of student achievement, while another study (Feldman 1989) found that instructor organization accounted for at least 10% of the variance.

Pascarella (2001) reports that good teaching practices appear to have a mixed effect on cognitive development. On the one hand, students' perceptions of teacher skill and clarity had little net impact. At the same time, students who judged their overall education as high in "teacher organization and preparation" demonstrated significantly larger gains than students who reported less well-organised and prepared instruction. Tsui (1999) found that group-learning had a positive effect on self-reported growth in critical thinking skills in fourth-year students. A predominantly qualitative follow-up study by Tsui (2002) found that the development of critical

thinking skills is linked to an emphasis on two pedagogical techniques: writing and rewriting with instructor feedback, and substantial classroom discussion.

IV.C. (ii) c) Student Behaviour

On the other side of the learning fence, Pascarella and Terenzini (2004) found that the quantity and quality of student engagement positively affects learning outcomes: “Other things being equal, the more the student is psychologically engaged in activities that reinforce and extend the formal academic experience (for example, library experiences, writing experiences, science effort, course learning), the more he or she will learn.” (p. 149) A related activity is that of peer mentoring, through which new students benefit from the experiences of an upper-year student. From providing help with course selection and academic expectations to simply sharing stories and experiences, the aim is to providing wisdom and experience, and reducing anxiety and uncertainty. A recent Canadian study found mixed support for the hypothesis that peer mentoring would have a positive effect on academic achievement (Rodger and Tremblay 2003), although it did show that students who continued in a full-year peer mentoring program into the second semester had significantly higher grades than did control group students.

With respect to extracurricular activities, a substantial body of research shows that many extracurricular activities, especially those that amplify or reinforce the formal academic experience, have a consistent positive impact on learning. Participation in intra-university athletics generally has no affect on learning, with the exception of men in revenue-producing sports (football and basketball) for whom participation has an inhibiting influence. Also, studies have consistently shown that Greek affiliation (fraternities and sororities) has a modest negative impact in first year of about .17 (7) in reading comprehension and .14 (6) in mathematics for men, and a disadvantage of about .20 (8) in reading comprehension for women. This is based on an analysis of the NSSL data by Pascarella et al (1996). A follow-up study found that this effect diminishes and then disappears in later years. The authors suggest that schools might seriously consider restricting Greek affiliation until the second year of university (Pascarella, Flowers, and Whitt (1999)).

IV.C. (iii) Computers and Distance Education

Computers, information technology, and networked computing are fundamentally altering the way PSE is delivered, consumed, and experienced. The new technologies have tremendous potential, promising to improve learning efficiency in the classroom, while allowing more flexibility through asynchronous instruction and real-time interactive distance education. While the use of computers in the classroom has its share of critics (Oppenheimer 1997), for the most part the technology is being adopted as quickly as technically and financially feasible.

IV.C. (iii) a) Computer-Assisted Learning

The general consensus in the literature is that computer-assisted learning is linked to modest increases at the individual course level. The most important pre-1991 survey is the meta-analysis of 149 studies conducted by Kulik and Kulik (1991). Based on this work, Pascarella and Terenzini (2004) determined that computer-based instruction produced average improvements in tested understanding of course content of .31 standard deviations, or 12 percentile points. The sizeable post-1991 literature pretty much confirms this result, giving an average effect size in favour of computer-based instruction of .28 standard deviations, or 11 percentile points.

This literature is beset by a number of methodological and experimental difficulties. As listed in Motiwalla and Tello (2000), these include the fact that

- almost all of the studies focus on student outcomes for individual courses, not on learning in college on the whole.
- self-selection effects confound almost all the data
- there is little research looking at the relationship between computer-based learning and individual learning styles.
- there is little research on the effect of multiple or overlapping technologies.
- there is a lack of longitudinal studies and otherwise controlled groups.

Addressing the first difficulty, there are two major studies of the impact of computer use during college on student learning in general: Kuh and Vesper (1999) and Flowers, Pascarella, and Pierson (2000). Kuh and Vesper relied exclusively on the effect of computer use on self-reported gains in cognitive outcomes among students at four-year institutions. They found that computer use in class was significantly and positively associated with these self-reported gains in a number of areas including writing, problem solving, and self-directed learning (Pascarella and Terenzini 2004, p. 99).

Using data from the NSSL, Flowers, Pascarella, and Pierson (2000) looked at the effect of computer use and email use on student learning at five two-year community colleges and 18 four-year institutions. They found considerable differences between the two types of institutions. For the four-year college sample, neither email nor computer use had any significant effect on cognitive outcomes at the end of first year. At two-year colleges, email use had modest, though significant, negative effects on cognitive outcomes (Flowers et al 2000, 649). Also, at the two-year colleges, the use of computers in class had a significant net positive impact on reading comprehension, while the corresponding effect at four-year institutions was statistically nonsignificant.

Ungerleider and Burns (2003) presents the result of a meta-analysis of the literature on networked and online learning, looking at the effectiveness of networked versus traditional forms of instruction. They focused on two measures: achievement measures (e.g. grades, test scores) and student self-reports of satisfaction. This survey found no achievement difference between the two forms of instruction, but did find a significantly negative effect of on-line instruction on student satisfaction. This is consistent with other sources (Bernard, Lou, and Abrami 2003) which also suggest that student preference for traditional instruction is not correlated to actual performance. Regardless of how they do in the course, students appear to prefer traditional forms of instruction.

IV.C. (iii) b) Distance Learning

With respect to distance learning, there are hundreds of studies examining the effectiveness of distance learning on general cognitive outcomes. According to the weight of evidence (Clark 1991, 1994; Carter 1996; Russell 1999), it appears that the specific medium of instruction has little impact on how much students learn. That is, distance education students learn just as much as students in conventional (on-campus) classes.

In an important meta-analysis of the literature on distance education, Bernard, Lou, and Abrami (2003) argue that the wide variability of results on the effects of distance education on learning means that it is simply incorrect to say that it is better than, worse than or even equal to classroom instruction. Many distance education applications have better achievement, satisfaction, and retention results than do regular classroom application. But on the other hand, many types of distance education do far worse than classroom instruction, on the same three measures.

But as Pascarella and Terenzini (2004) acknowledge, almost the entire body of research on this topic is beset by serious methodological difficulty, because the two contrast groups (on-campus versus distance education students) are entirely self-selected, which could bias the results in numerous unknown ways.

There is not nearly as much evidence on the effect of computer use and information technology on cognitive skills and critical thinking as there is on general learning. One interesting study by Liao and Bright (1991) was a meta-analysis of 65 studies looking at the impact of learning a computer language on cognitive growth. Using the data provided by Liao and Bright (1991), Pascarella and Terenzini (2004) determined that the use of computers in learning and coursework has a positive influence on cognitive skills. They computed that learning a programming language provides a fairly substantial advantage of .35 standard deviations (14 percentile points) in various cognitive skills over students who did not learn a programming language (Pascarella and Terenzini 2004).

An “exploratory” study by Motiwalla and Tello (2000) attempted to address some of the methodological and experimental difficulties mentioned above. They report the results of a survey conducted to determine the impact of a web-based course model for distance education on student satisfaction. They surveyed 550 undergraduate students (190 responses) enrolled in 31 courses at a single, large, public university. The result was general satisfaction, with 75% approval (“strongly agree/agree”) of the course pedagogy and delivery mechanism, with 74% of students indicating they would recommend the web-based model to other students (Motiwalla and Tello 2000, 263).

A Canadian study by Kanuka (2001) had two objectives: First, to identify the needs of students in distance-delivered programs over the web, and second, to identify strategies for increasing the effectiveness of the web in delivering distance education. She found that the main difficulty encountered by the students was “working with instructors who did not have expertise with the technologies; a lack of timely and informative feedback; and vague or confusing instructions.” (Kanuka 2001, p. 49) This is consistent with a large body of research indicating that, regardless

of the instructional medium, the most important factors affecting student satisfaction and learning are instructor clarity, organization, and coherent syllabus structure.

V. THE RESEARCH ROLE OF UNIVERSITIES AND ITS EFFECTS IN LEARNING

V.A. Introduction

In addition to being institutions which transmit knowledge, some post-secondary institutions are also large centres of knowledge creation. In particular, the “research university” – that is to say, large, multidisciplinary institutions with substantial graduate-level education programs and sophisticated scientific/biomedical facilities – is in many instances a major national or regional centre of innovation with positive spillover effects into the entire economy (Rhodes 2001).

It is sometimes claimed (AUCC 2005) that Canada is behind other nations in research and development and that this requires greater investments in university-based research. The syllogism implied in the statement is questionable. It is undoubtedly true that Canada spends a lower percentage of its GDP on research and development than other countries - the figure is 2.0% in Canada compared to 2.6% in the United States and 2.3% in the OECD as a whole (OECD 2004). What is less obviously true is that Canada is underinvesting in university research. Indeed, compared to other countries, Canada performs significantly more of its total research output in universities than do other countries. OECD’s 2004 Science and Technology Indicators show that nearly 35 percent of all R&D in Canada is performed at universities, compared to just 17% in the United States and 18% in the OECD as a whole. As a result, Canada more or less leads the world in the proportion of GDP spent on research performed in universities – our research deficiency problem to a very large extent resides in the private sector.

There is always a certain tension between the teaching mission of universities and the research mission of universities. The model of the American research university – largely based on models from Scotland and Germany – has given rise to the notion that the union of the research and teaching functions within a single institution (and, ideally, within a single faculty member) is the very essence of the university. In accordance with this ideal, many academics contend that there is a symbiotic or mutually reinforcing relationship between these two activities, although the claim comes in varying strengths. In its strongest version, the claim is that teaching and research can not be pulled apart, because they are just different aspects of the same basic academic activity (Weston 1986). A slightly weaker claim is that productive research and effective teaching are complementary activities. For example, Braxton (1996) argues that because teaching and research involve common values (e.g. rationality) and require similar skills, they are mutually supporting and reinforcing activities.

For all the passion and energy that it arouses, the debate tends to operate almost entirely in the domains of rhetoric and normative ideals, with very little attention paid to any empirical evidence regarding the teaching and research relationship. There are three sets of questions here that need to be examined more carefully: First, how does the teaching and research relationship affect learning outcomes (e.g. how do research universities compare with liberal arts colleges?). Second, what is the productive relationship between teaching and research (i.e. are they complementary, antagonistic, or independent activities?). Third and finally, how does the

research and teaching relationship fit into the mission of the university and how does the academic reward structure affect this balance?

V.B. Learning Outcomes by Institutional Type

In order to test the idea that there is a tight relationship between teaching and research, one place to start would be by looking to see if learning outcomes at research-oriented institutions differ in any significant ways from those at teaching schools. The literature on this is not large, and the quantitative results that we do have tend to show either mixed, trivial, or non-existent differences.

Smart (1997) found that institutional type was unrelated to self-reports of learning gains, a result that is supported by more recent work by Pike, Kuh, and Gonyea (2003). At the same time, a very recent analysis of the NSSE data suggests that liberal arts colleges have an inhibiting influence on self-reported development in cognitive skills (Hu and Kuh 2003).

Ultimately, Pascarella and Terenzini are surely right when they note that the broad Carnegie classifications by institutional type “are so general that each might include institutions differing substantially in other characteristics that have more immediate and important implications for how much students learn.” (Pascarella and Terenzini 2004, 83). That is to say, that there is so much variation within each Carnegie category that any between-category differences are completely obscured. For a proper evaluation of the teaching and research relationship, we therefore need to push the analysis deeper into the institution, and look at the teaching and research activities and outcomes of individual professors.

V.C. The productive relationship

There are four possible relationships between teaching and research. They might be *integrated*, where teaching and research overlap substantially, if they are not in fact identical enterprises. There might be *positive* relationships, where either teaching has a positive influence on one’s research, or research has a positive relationship with one’s teaching. Teaching and research might be *independent*, in that neither has any influence on the other. Finally, the relationship might be *negative*, where teaching negatively affects research, or the converse (Coate, Barnett, and Williams 2001).

Hattie and Marsh (1996, 2002) set out to determine the nature of the productive relationship between teaching and research. Specifically, they set out to test the hypothesis that teaching and research are complementary activities by looking for a correlation between effective teaching and research productivity. In their 1996 meta-survey of the literature, Hattie and Marsh found a correlation between teaching effectiveness and research productivity of 0.06, which they note is statistically indistinguishable from zero. It was a robust result, holding across various disciplines, teaching methods, and institutional types. They concluded that the notion that teaching and research are inextricably linked is nothing more than “an enduring myth.”

In a 2002 follow-up study, Hattie and Marsh looked at a number of mediating variables that might have affected the 1996 results. This study was based on a sample of 182 academics at a single large Australian university. It found that the relationship between effective teaching and research productivity was 0.03, again statistically indistinguishable from zero. They concluded that teaching and research are “independent constructs,” and that “good researchers are neither more nor less likely to be effective teachers than are poor researchers. Good teachers are neither more nor less likely to be productive researchers than are poor teachers.” (Hattie and Marsh 2002)

The most rigorous and up-to-date work on the teaching and research relationship has been conducted by Fairweather (2005, 2002, 1996). Like Hattie and Marsh, Fairweather challenges the “myth” of teaching and research, but from a slightly different perspective. Where Hattie and Marsh look at the relationship between effective teaching and productive research, Fairweather examines the belief that “all aspects of faculty work – particularly teaching and research – can be equally addressed by the work of each faculty member” (Fairweather 2002). Using data from the 1992-93 National Study of Post-secondary Faculty (NSOPF), which surveyed 26000 faculty from 817 institutions in the United States, he looked at the productivity of faculty members in both research and teaching and then attempted to find statistical relationships between the two.

To measure research productivity, Fairweather counted articles published in refereed journals during the previous two years. For teaching productivity, he counted in-class contact hours, independent studies, and graduate supervision. In answering the first question, Fairweather found that 50% of faculty are highly productive teachers, across all institutional types. Additionally, he found that 39% of faculty at liberal arts colleges are highly productive researchers, while 50% of faculty at research institutions are highly productive researchers.

In looking at the second question, Fairweather found that only 22% of faculty are *both* highly productive teachers and researchers. Furthermore, only 6% of faculty who used more effective (but time-intensive) pedagogical techniques such as collaborative learning and active instruction were both highly productive teachers and researchers. Given what we have seen about the relative value of these pedagogical techniques, this should give pause to those who remain swayed by the ideal of the combined teacher and researcher, or what Fairweather calls “the complete faculty member.”

So despite Colbeck’s argument that many faculty are able to merge teaching and research “in a seamless blend” (Colbeck 1998), it would seem that the teaching and research relationship is more of a zero-sum game than most academics like to admit, and “For most faculty members, generating high numbers of student contact hours diminishes publication rates, and vice versa.” (Fairweather 2002, p. 45).

V.D. The teaching and research balance

The conclusion that teaching and research are almost completely independent activities is increasingly reflected in the academic reward system. By the end of the 1980s, many within the academy (both in Canada and the US) had grown concerned that research had come to dominate

the university's mission, largely at the expense of undergraduate teaching. In a widely read report prepared for the Carnegie Foundation, Ernst Boyer (1990) lamented the way the priorities of the university had shifted from an emphasis on undergraduate teaching to a near-obsession with peer-reviewed research. He suggested that the solution to the misaligned priorities was to move beyond the simple opposition of teaching versus research, and think instead of "scholarship" in a broader, more inclusive way. He called for the recognition of four types of scholarship (*discovery, integration, application, and teaching*), each of which would be seen as equally important to the university's mission and rewarded as such.

A similar study was commissioned by the Association of Universities and Colleges of Canada in 1990. The resulting report (Smith 1991) raised concerns about the "Americanization" of Canadian universities, insofar as the emphasis on research at the expense of teaching had worked its way north of the border. The report recommended broadening the definition of "scholarship" to include pedagogical innovation, and proposed a number of additional remedies, such as minimum teaching loads for all faculty, and allowing faculty to decide whether they wanted to be evaluated on the basis of their teaching or their research.

Both reports were widely read, and both inspired a spurt of pro-teaching rhetoric and activity. Canadian universities created offices or centres of teaching and learning, established committees and programmes to improve teaching, and everyone paid lip service to the value of effective teaching (Samad et al 1995). The Boyer report had an even greater impact in the United States. Some states passed legislation tying public money for universities to a renewed commitment to teaching, while many universities established centres for teaching, learning, and professional development.

This rhetoric plays to a very wide constituency. For external stakeholders such as governments, taxpayers, and the parents of students, the legitimacy of the university rests on its ability to deliver undergraduate teaching (Boyer 1990). At the same time, faculty across all institutional types express a distinctive "normative unity" in endorsing teaching as the core value of academe. With the exception of those at research institutions, faculty at all institutional types express widespread agreement with the statement that teaching effectiveness should be the primary basis for tenure. Even at research universities, faculty rate the relative importance of teaching and research almost exactly equal (Leslie 2002; but for an indication that faculty are starting to rank teaching less highly see Fairweather and Beach 2002).

Despite this normative unity, the problems identified by Boyer and Smith remain. Over the past fifteen years, studies have repeatedly shown that research productivity is the strongest indicator of faculty pay rates, while teaching productivity is either unrelated to, or negatively correlated with, faculty compensation (Fairweather 1996). In a recent study designed to determine if the post-Boyer changes had had any effect, Fairweather found that undergraduate teaching is as undervalued as ever. Since the mid-1990s, research has become an even stronger positive predictor of pay at all types of institutions. Meanwhile, time in the classroom continues to be negatively correlated with pay, with the trend actually worsening at liberal arts colleges and other teaching-oriented institutions (Fairweather 2005).

This gap between rhetoric and reality gives rise to a bit of a paradox, in that “faculty are motivated to teach, spend most of their time teaching, prefer that they be rewarded for teaching effectiveness, but that institutions may actually reward them for something else. That something else is clearly a percentage of time spent on research” (Leslie 2002, p. 69). The paradox is due to a handful of related and ineluctable features of the academic job market. First of all, that market is thoroughly cosmopolitan, in that universities draw on a global market for professors. A corollary of this is that the academic sense of loyalty and professional identity is disciplinary, not institutional. Teaching has value at the local and institutional level, while research has value at the global and disciplinary level. Consequently, one’s standing within academia is tied almost exclusively to one’s research productivity and quality.

This is compounded by the fact that excellence and productivity are much harder to measure for teaching than for research. When you combine this with the fact that the inter-university competition for students is itself becoming a “prestige” market, with universities building their brands around high-priced and high-status “star” faculty, it is hardly surprising to find that research trumps teaching even at supposedly teaching-oriented schools. In the absence of any concrete effort to intervene in the prestige market for professors, there is no reason to expect that the situation will change (Twitchell 2003).

VI. FINAL OUTCOMES

With respect to a huge number of life outcomes, from health and happiness to status, employment, earnings, and job satisfaction, the simple decision to attend university and earn a bachelor's degree is the single most important decision an individual can make in our society. All other decisions -- such as which institution to attend, what to major in, even how hard to work -- pale in comparison. That is not to say that these other considerations do not matter, because they certainly do. It is simply to draw attention to the yawning socioeconomic chasm that separates those who have at least a bachelor's degree from those who do not.

The literature on the various outcomes of PSE is almost as large as the literature on pedagogy, and it is equally difficult to even begin to summarize. Again, a good analytical synthesis is to be found in chapters 9 and 10 of *How College Affects Students* (Pascarella and Terenzini 2004). In this section, we focus primarily on labour market outcomes, particularly the effect of PSE on earnings, paying special attention to the net effects of PSE, the differential effects of institutional selectivity, choice of major, gender, and academic achievement. We will follow this with a smaller section that focuses on the social outcomes of post-secondary education.

VI.A *Financial and Labour-Market Outcomes*

VI.A. (i) Net effects

In North America, earnings are strongly correlated with educational attainment. In particular, university graduates earn substantially more than high school graduates, and the gap between the two is actually increasing, due to a faster rate of growth in earnings for individuals with a bachelor's degree than for individuals with a high school diploma (Perna 2003; Mortenson 2000). For example, between 1967 and 1971, holders of a bachelor's degree had an earnings advantage of 48.5 percent over those with a high school diploma. Between 1992 and 1996, that advantage was 79.8 percent ("Is College Still Worth the Cost?" 1998).

We need to recognize that not all of this earnings premium can be attributed to the degree itself, since it might be that the sorts of attributes that lead a person to attend university are the same ones that lead to success in the job market. There is a large recent literature that attempts to control for these factors. Of particular worth is the work of Grubb of the University of California (Berkeley) (Grubb 1996, 1997, 1998; but note also Cancio et al 1997; Groot, Oosterbeck & Stern 1995; and Leslie and Brinkman 1988.) In their synthesis of the relevant work, Pascarella and Terenzini estimate an annual net earnings premium for a bachelor's degree (versus a high school diploma) of 37 percent for men, and 39 percent for women (Pascarella and Terenzini 2004). Consistent with this is a recent study by Perna (2003), which found an average earnings premium of 37 percent, with no significant difference between men and women.

Of course, PSE has an opportunity cost in form of tuition and related expenses as well as foregone earnings during the time spent in school. That is why some researchers have attempted to calculate not only the increased earnings that are associated with PSE, but the private rate of

return as well. The point is to determine whether PSE, considered as an investment, is worth it. The calculations can get pretty complicated, but for some examples see Becker (1992) and Cooper & Cohn (1997). The literature over the past twenty years has consistently estimated an average rate of return of a bachelor's degree of around 12 percent. As Boesel and Fredland (1999) point out, this compares favourably with other investments, such as stocks and bonds. In fact, the real rate of return is probably even higher if we consider earnings during school (since many students work part time), as well as benefits, are more substantial in the sorts of jobs that tend to be held by university graduates, such as health care and professional development. Cooper and Cohn (1997) suggest that depending on how you measure things, the real rate of return of a bachelor's degree might be as high as 19.3 percent.

In Canada, the issue of returns to PSE has not been quite so exhaustively studied; however, what evidence exists suggests that rates of return to post-secondary education are considerably lower than they are elsewhere. With respect to returns to university schooling, the OECD's Education Indicators (2005) show that 17% of Canadians 25-64 with a university education have incomes below 50% of the median, a level higher than any other country. The 2003 OECD indicators show that private rates of return to tertiary education for females in Canada is the same as in other countries, but that returns for males are considerably lower (8.4% vs. an OECD country average of 11.4%).

Emery (2004), conducted a meta-analysis of twenty-one studies in Canada, and suggested that these private returns are declining (at least to universities), in part because of increasing tuition fees. Total returns to university education, however, seem to be increasing. With respect to the returns to other kinds of education, Rathje (2000) suggests that returns to college education (both private and social) are lower than for university, and that the return to trades education is effectively zero. This may, however, be an artifact of Statistics Canada's definition of "trade and vocational education", which is distinguished from "college" education only by entrance requirements ("college" programs require a high school diploma; "trade-vocational" ones do not). This definition results in the odd situation where the same program may be classified differently in different provinces, or even differently in the same province from year to year if entrance standards change. Rathje's findings may in fact indicate that far from providing no return, trades education are, for those who never finish secondary school, an effective means of bringing their earnings up to at least that of high school graduates.

VI.A.ii Institutional Effects

For fairly obvious reasons, many researchers are interested in the question of whether there are significant differences in outcomes between different types of institution. That is, whether outcomes vary according to size, classification, institutional control (private versus public), selectivity, and so on. Given the widespread interest in various schemes for ranking the quality of schools, the question of the economic effects of institutional quality has been the focus of considerable interest (Thomas 2000, 2003; Dale and Krueger 2002; Brewer et al 1999).

The general body of evidence suggests that institutional quality, no matter how it is measured, has significant net positive impacts on earnings. Estimates of the size of the effect vary, however,

with the prevailing view being that the ultimate effect is fairly mild. For example, Pascarella and Terenzini (2004) estimate that, once individual characteristics and various institutional features are controlled for, attending a selective college is associated with an earnings premium of between 2 and 4 percent (where selectivity is defined as a student body with 100-point higher average SAT scores).

This figure is substantially lower than that found by other researchers. Zhang (2005) distinguished three levels of institutional quality (low, middle, and high), and found that graduates from high-quality institutions have an earnings premium of 20 percent over graduates from low-quality colleges, while even middle-quality graduates enjoy a premium of 10 percent over low-quality graduates. These figures are comparable to those found in Brewer et al (1999) and Thomas (2003), and are robust across a number of different measures of institutional quality.

Pascarella and Terenzini (2004) argue that virtually every study on the subject is compromised because of a failure to control for ambition. Treating the average selectivity of the schools to which a student applied as a proxy measure of ambition, Dale and Krueger (1999) found that, when ambition is taken into consideration, the earnings premium associated with institutional selectivity disappears. This suggests that the observed earnings premium might simply be a consequence of the fact that extremely bright and ambitious students are more likely than other students to attend and graduate from highly selective colleges.

VI.A.iii Within Institution Effects

It is widely accepted that one's choice of major field of study has a significant impact on earnings, although there is not a great deal of evidence for this (Finnie 2001). Coté and Sweetman (1997) is a good review of the Canadian and American literature on earnings by discipline, although it is getting out of date. Pascarella and Terenzini (2004) point out that it is difficult to draw any general conclusions from the literature because of a lack of consistency over how "major" is defined across studies.

Nevertheless, there appears to be clear and consistent evidence that the largest earnings accrue to graduates from those majors that have a specific and well-defined body of content and skills, emphasize quantitative methods, and have a clear functional link to an occupation with high earnings. These include engineering, business, computer science, health science, and some of the physical sciences (Finnie 2001; Grubb 1998, 1998; Dowd 1999; Coté & Sweetman 1997; Rumberger and Thomas 1993). Pascarella and Terenzini (2004) estimate that, once you control for other factors, the difference in earnings between individuals from different fields of study is between 25 and 35 percent.

In Canada, Finnie has done some very good work recently on a number of labour-market outcomes (Finnie 2001, 2004). His results are consistent with most of the previous evidence, concluding that the clear earnings leaders are medical professionals. In the second rank we find graduates in law, engineering, computer sciences, and other health disciplines, while the third rank includes teaching and commerce. The fields at the bottom of the earnings levels include arts and humanities, general social sciences, and biology.

VI.A.iv Gender Effects

Even as women are now the majority on most university campuses in North America, men still tend to be better represented in the high-earning majors (such as medicine and engineering) while the reverse is true for women (Eide 1997; Jacobs 1995). Women are overwhelmingly more likely to enter the low-paying fields, such as education, the humanities, and nursing. There is evidence that this gender segregation is gradually diminishing in some disciplines at least, but Finnie (2001) argues that a more interesting fact is how *stable* the gender distribution appears to be. From 1982 to 1990, “the only significant shifts were a moderate decline in the percentage of engineering graduates and an increase in fine arts and humanities amongst men, and declines in teaching and other education amongst women, offset most particularly by increases in commerce and general social sciences” (Finnie 2001).

This is important because it would appear that differences in choice of academic major between men and women accounts for part (but not all) of the gender gap in earnings (Cooper and Cohn 1997; Sweetman 1994). There remain significant within-field disparities, with women generally earning as low as 72 cents on the male dollar. An American study by Turner and Monk-Turner (2001) calculated that the average earnings of a white woman with a bachelor’s to a comparable man is 73 cents to a dollar, and 75 cents to a dollar for black and Hispanic women. A study by Thomas (2003) reports that, on average, women earned around 79 cents on the male dollar, although the differential ranges from 72 cents on the male dollar for social science graduates to a 2-cent *premium* for women engineering graduates.

The question of the gender earnings gap has been the focus of a tremendous literature, much of it fraught with political agendas and antagonisms (for a particularly egregious example, see Warren 2004). As pointed out by Drolet (2002), estimates of the gap are very sensitive to the measurement instrument that is used, and while many researchers despair of seeing the unexplained part of the gap eliminated (Pascarella and Terenzini 2004), a recent Canadian study suggests that for the most recent cohorts of graduates, almost all of the gap can be explained. Finnie and Wannell (2004) conclude that labour market returns are largely gender-neutral for the last group of graduates. The most important factor is hours of work, with past work experience, job characteristics, family status, and province of residence and language having smaller influences.

VI.A.v Achievement Effects

While it is clear that substantial economic benefits accrue to those who attend and graduate from an institution of higher education, it is not obvious that academic achievement – that is, good grades – matter as much as one might expect. Based on a review of 27 studies published between 1989 and 2000, Pascarella and Terenzini (2004) conclude that undergraduate grades have a significant and positive impact on post-graduate earnings, for up to 19 years after graduation. Some of the more important of these studies include Thomas (2000) and Fitzgerald (2000). Their best estimate is that each full grade-group increase (e.g. from a C+ to a B+) is worth an average earnings premium of 6.8 percent over the lower grade group. No similar studies appear to have

been done in Canada, although the National Graduates' Survey does contain sufficient information to permit such an examination.

A more recent study of American graduates by Donhardt (2004) challenges this conclusion. This study employs unemployment insurance data to track baccalaureate graduates for the four years after graduation, between 1997 and 2001. While Donhardt found that one's major field of study was significantly related to earnings, he found that grade point average exerted a *negative* influence on earnings in the first two quarters after graduation, after which GPA exerted no significant influence at all.

While we should not put too much weight on this one study, it does force us to confront the question of what exactly is being rewarded. That is, given what we know about the impact of PSE on post-graduate earnings, what can we say about a degree that the job market actually values?

VI.A.vi What is being rewarded?

Does the job market reward academic progress and achievement with higher salaries, or is the degree being used merely as a device for signalling pre-existing characteristics such as motivation, talent, intelligence, social abilities, and so on? This is the subject of a long-standing dispute in the literature between two main theories, the *human capital* theory, and the *signalling/screening* theory.

According to the human capital theory, PSE is an investment, in which the student builds capital in the form of skills and knowledge. The more human capital you have the more productive you will be as an employee, which is reflected in higher earnings (Becker 1964, 1993). In contrast, the certification theory argues that a degree is simply used by employers as a filter or screening device to reduce the pool of applicants. What matters is not the actual skills or knowledge that the student has acquired, but simply that he or she has shown that she has certain character traits or abilities (e.g. persistence, dedication, organization) that employers value, and which the degree signals (Collins 1979; Hirsch 1979; Wolf 2000; Leiper 1993). This is not a small difference in opinion; as Riddell (2005) puts it: if the human capital theory is true, then post-secondary education has both private and social returns; if the signalling theory is true, then education has private returns but not social ones.

With respect to education generally, there is an increasingly widely-held view in economics that human capital theory is right and signalling theory is wrong. Within the Canadian context, the most persuasive study that backs the human capital thesis is Lemieux and Card (2001), which studied the different effects of the Veterans Rehabilitation Act in Ontario and Quebec and concluded that there was a very high return to investments in PSE. This is not the only study cited with respect to human capital in Canada; Sweetman (1999) and Oreopoulos (2004) use other natural experiments to demonstrate similar returns to schooling, but since these studies relate to changes in secondary school systems they do not make the case as compellingly as Card and Lemieux. Unfortunately, because the Card and Lemieux result describes the returns to increasing university participation in the late 1940s and early 1950s, when participation rates

were under 5%, it is unclear if the result would hold in today's world of 25-30% participation rates.

Indeed, one general problem with the kinds of studies that look at returns to education is that they are not very good at determining whether or not these returns are constant, or whether there are diminishing returns. This is also true of major international studies such as OECD (2001) which looked at the determinants of growth in developed countries in the 1990s, and concluded that increasing average educational attainment by one year increased average GDP growth by half a percentage point. This sounds as if it is an impressive result, but given that some of the fastest growth in the OECD was in countries with the lowest educational attainment (e.g. Portugal), the possibility of diminishing marginal returns cannot be ruled out.

The weight of evidence would suggest that while neither the human capital nor the signalling/screening theory position offers a complete account of what is being rewarded by the job market, it would appear that there is some truth to both theories. As evidence for the human capital theory, many proponents point out that that average earnings increase by around 2 percent with each additional year of PSE. At the same time, there is also a "credential" effect, a bonus for completing the degree. That is, an individual with a bachelor's degree earns a premium of between 10 and 15 percent above someone with the equivalent number of credits but no degree (Turner & Monk-Turner 2001; Arkes 1999; Grubb 1998).

Similarly, the evidence with respect to grades and earnings summarized by Pascarella and Terenzini (2004) reported above supports the human capital theory, in that those who acquire more or "better" capital end up with higher earnings. Yet to the extent that Donhardt's (2004) study is valid, the absence of any significant positive relationship between higher grades and higher earnings supports the certification theory.

Again, there might be something to both theories. Walters (2004) reports a Canadian study based on survey data from the National Graduate Surveys. Walters tested the human capital and certification theories by looking at graduates' self-reported assessments of the extent to which their job is related to their education. He reports mixed results, such that the viability of the two positions depends on the program or field of study. The human capital theory is supported by results in applied and technical programs, while the signalling/screening position appears to be supported by the reports of liberal arts graduates (Walters 2004).

Social Outcomes

As mentioned earlier, not all benefits of post-secondary education are purely economic in nature. Other benefits of an educated populace range from stronger social cohesion, appreciation of diversity to less reliance on the health care system. These benefits are often harder to measure than rates of return but are no less important.

Many North American studies have found that an individual's level of education does have an effect on their citizenship, as defined by participation in civic and community affairs. In Canada, Gidengil et al (2004) have shown the differences in voting rates by education level and Blais et

al (2002) showed that in the 2000 election, voting rates among university graduates born after 1970 were 50 percent higher than for those of the same age that had not completed high school.

Education is also closely linked to charitable giving and volunteering. Sturm (1997) found that many community agencies enjoy voluntary assistance and leadership that come heavily from more highly educated groups. Statistics Canada's 1997 and 2000 National Survey of Giving, Volunteering and Participating shows that individuals with post-secondary education tend to make charitable donations of larger amounts more often, volunteer greater amounts of their time, and participate actively in civic affairs.

There is some evidence of a link between education, crime and incarceration, with greater amounts of time in school being associated with lower levels of criminal activity (OECD, 1996 and Ungerleider 1999). Sturm (1997) observed education to have an effect on the crime rate when crimes of "profit" are separated from other crimes; that is, the relationship of [a lack of] education to crime can be demonstrated for crimes of profit (i.e., theft), but not for profitless crimes (i.e., sexual assault) when other factors are controlled. Related statistical data shows that individuals with a high school education or less comprise only 34% of the population, but make up 75% of the federal prison population and over 70% of the population in provincial jails. (Canadian Centre for Justice Statistics, 1996 and Ungerleider 1999)

One must, however, be very cautious when considering these findings, as many other variables no doubt influence results. For instance, a possible reason for the low numbers of those with post-secondary education being incarcerated could be a result of the greater probability of higher income; they are more likely able to afford proficient legal counsel. In addition, it is almost impossible to conclude whether the same factors that led individuals to drop out of school, such as an unstable home environment and peer culture, could lead them to criminal activity. Despite data limitations and the crude estimates for some of the desired statistics, Ehrlich's (1975) results appear to be highly consistent with the proposition that those with lower schooling levels and training, and hence lower potential legal income, have a relatively greater tendency to engage in crimes against property.

Education also appears to have a positive impact on individuals' health and well-being. Individuals with higher levels of education tend to enjoy better physical and mental health. Health and Welfare Canada (1993) studies indicate that level of education affects individuals' lifestyle choices related to physical and mental health. Pascarella and Terenzini's 1991 and 2004 reviews of the American literature suggests that PSE-educated citizens are no more or less likely than others to visit a physician, but they are more likely to use health services for preventative purposes.

Health and Welfare Canada (1993) also showed that the better educated also spend less time in the hospital, are more capable of dealing with physical impairments or limitations, and report more often that they enjoy good health. This is important since Statistics Canada's *National Population Health Survey 1994* defined aspects of better health to include being less likely to be overweight, less likely to suffer from chronic high blood pressure or diabetes, more likely to be physically active, less likely to smoke, and more likely to quit smoking.

CONCLUSIONS

We conclude this review by evaluating our results, in light of three guiding questions:

- What generalizations may be reliably drawn from the empirical evidence in the various aspects of post-secondary education?
- What are the major gaps in our knowledge?
- What are the most profitable lines of future inquiry?

The globalization of higher education has led to an almost obsessive interest in the question of quality, both its measurement and its management. This has had an effect on the university, on both the administrative side (e.g., governance and accountability measures) and the academic side (e.g., class size, curriculum, hiring policy). Regarding quality, measurement has become a particularly touchy subject, fraught with political agendas both within the schools and with respect to external stakeholders. The political nature of the concern over quality is exacerbated by the lack of any substantial agreement over just what it is our institutions of PSE are supposed to be excelling at.

The steady rise of tuition in most jurisdictions, as well as the deregulation of fees for many professional programmes, has led to widespread concern over rising student debt, and the assumed effects this has on accessibility. Yet it would appear that many of these concerns are somewhat overstated. The best work in the area suggests that popular assumptions about the link between tuition, debt, and accessibility are mistaken, at least in Canada. After more than a decade of steady tuition increases across the country, enrollment growth remains strong, easily exceeding population changes.

In the area of learning, the most significant generalization we can draw is that a number of things that are considered “common knowledge” are not, in fact, grounded in empirical research. Perceived institutional quality, or “reputation” has little demonstrated effect on learning outcomes. The conditional effects of post-secondary education are very small (the exception here is gender, where effects are usually shown to be relatively large, but the results are inconsistent or even contradictory). Class sizes have not been proven to have a consistent effect on learning outcomes. Similar considerations apply to the use of technology, both within the classroom and for distance education. Finally, student grades don’t seem to be especially well correlated to long-term outcomes such as employment and income. There is, presumably, the possibility that these research findings may at some point be contradicted. As it stands, however, it seems that much common wisdom in PSE needs to be treated with some gentle scepticism.

Class size alone appears to have little effect on subject-matter knowledge acquisition; there is a strong body of research showing a positive link between “progressive” pedagogical techniques and an array of learning outcomes. Various forms of “active” or “collaborative” learning, usually built around small groups and regular peer and instructor feedback, are correlated with superior outcomes in learning, cognitive skills, academic performance, and student satisfaction. Furthermore, some of the clearest gains in learning outcomes are associated with the basic building blocks of good teaching, especially instructor clarity and lecture organization.

Unfortunately, this result is somewhat at odds with the concept of “complete faculty member.” The heart of this myth is the notion that research and teaching are simply two aspects of the same endeavour, and that a faculty who excels at the former will necessarily excel at the latter. The literature does not support this widespread belief. As best we can tell, there is a significant relationship between excellence or productivity in teaching and excellence or productivity in research. If anything, they are antagonistic tasks, in that time spent on one takes away from time spent on the other. This is a problem because the pedagogical techniques that are known to produce superior learning outcomes are extremely time-consuming.

Going beyond learning, a large number of the favourable positive outcomes associated with PSE are in effect, outcomes that are determined at the point of entry. The decision to enroll in the first place makes a big difference to long-term outcomes. Similarly, a great deal of the long-term benefits of PSE, in a financial sense, accrues simply to the decision to pursue courses in the hard sciences, engineering, and the professions as opposed to the humanities, education, and some of the social sciences. Of course, these “choices” are not open to all; institutions ration spaces in these areas by demonstrated ability, which in turn suggests that a great portion of the returns to education are based at least indirectly by endogenous factors (motivations, academic preparation, etc.). More directly, student study habits appear to have a major impact on learning outcomes, but while the work of George Kuh and the National Survey of Student Engagement appears to show that institutions can influence this by providing students with better “learning environments,” the scope for institutions to change students’ habit would appear to be limited. To put it bluntly, research has not been able to show in any convincing way that institutions matter very much.

These are somewhat disquieting results, given the vast sums of money that are devoted to post-secondary education generally, and to universities specifically. In effect, the research is very clear that there are gains to be had in post-secondary education, but very unclear about what precisely is occurring at university to cause those gains (which in turn gives credence to the prevalence of signalling theory over human capital theory at the post-secondary level). Arguably, what the evidence shows is that letting a reasonably capable large group of young adults congregate and mature together in a scholastic setting over a four-year period is what creates the major gains. There is presumably more to it than this, but on the basis of present research, it is difficult to say what this “more” is.

This is the most glaring gap in our understanding in the field of post-secondary education, and it is imperative that we understand why the state of “R&D” in education is so weak. It is helpful to compare the state of education with that of medicine: In many respects, educational practice is no more advanced than it was 150 years ago. Yet while mid-19th century medicine was barely out of its Galenic doldrums, still mired in guesswork and quackery, the field has seen substantial progress since then (to say the least).

The major difference between medicine and education is that while medical knowledge is based largely on biology and chemistry, our educational knowledge is social and psychological. It is far more difficult to run controlled experiments and to standardize and operationalize practices and techniques in psychology than it is in biology, which means that it is more difficult to draw any useful generalizations from any given education “treatment.” More often than not, we simply do

not know which aspect of the treatment, if any, has had a noticeable effect. We are hampered by a fundamental inability to perform controlled educational experiments, which means we never really know how any change in our practices will work out.

If we set aside the basic problem of our lack of knowledge of the factors affecting learning (which may be insuperable), we find that there are a number of narrower areas in which we are equally ignorant, but in which we might find more profitable avenues of research. For example, we have no real idea why men seem to gain more in a cognitive sense from PSE than do women. One possibility is that higher education is a profoundly “gendered” experience, that our institutions are systematically biased towards men in a host of ways. Another possibility is that the differences are bred in the bone, that the gap reflects different rates of maturation between the genders. Or it may be neither of these. The fact is, we have no idea, but given that women constitute a growing majority on our campuses, it is imperative that we engage in further research in this area.

Parallel considerations apply to the field of online and distance learning. According to the existing literature, it appears that the specific medium of instruction has little impact on how much students learn. That is, distance education students learn just as much as students in conventional (on-campus) classes. But as we noted in the body of this survey, the two contrast groups (on-campus versus distance education students) are entirely self-selected. This undoubtedly biases the results in numerous unknown ways. Given the rate of growth in this field, as well as the amount of money that is being put into new technologies, we need a great deal of quantitative research, based on controlled or natural experiments, into the effects of online technology on learning.

In conclusion, it is clear that we need to dedicate substantially more resources to research into higher education. Outside of the field of access to education, the state of research on post-secondary education in Canada is moribund. There are some very good individual researchers, but there is no centre for research on post-secondary education in Canada that could bear serious comparison to the half-dozen best centres of research in the United States. This is a problem because we have no way of knowing the extent to which findings from other countries will be applicable here. Even the research we do have is weighted almost entirely toward the university sector; as noted in the introduction, the college sector in Canada requires attention.

This is no mere academic exercise. As just about every academic, journalist, politician and pundit has noted in recent years, our society is undergoing a tumultuous transition, in the face of profound demographic, technological, and geopolitical forces (Friedman 2005; Florida 2003).

This transition, from manufacturing and services to a post-industrial economy, has consequences that are at least as profound as the previous transition from agriculture to industry. This will alter the way wealth is created and all that flows from it, including social structures, population flows, and political stability. Virtually everyone concedes that education and innovation hold the key to surviving and thriving in this new economic order, yet the temptation is to simply throw more money at our existing practices and institutions. Given the paucity of our knowledge, that we really have no idea what we are doing, this is something we simply cannot afford.

APPENDIX A: List of Journals that were manually searched

ASHE-ERIC Higher Education Report.
Assessment & Evaluation in Higher Education._
The Canadian Journal of Higher Education.
Change Magazine
The Chronicle of Higher Education.
Education Canada.
Education Economics.
Education Quarterly Review._
Education Statistics Quarterly._
Educational Research.
Educational Research and Evaluation.
Educational Research for Policy and Practice._
Educational Research Quarterly._
Educational Researcher.
Higher Education._
Higher Education Management and Policy._
Higher Education Policy.
Higher Education Quarterly._
Higher Education Research and Development.
Innovative Higher Education._
International journal of distance education technologies.
Internet and Higher Education._
Journal of Distance Education.
Journal of Excellence in Higher Education._
Journal of Further and Higher Education.
The Journal of Higher Education.
Journal of Higher Education Policy and Management.
Journal of Vocational Education Research._
New Directions for Higher Education (series: Jossey Bass)
Perspectives: Policy & Practice in Higher Education._
Quality in Higher Education.
Recruitment and Retention in Higher Education._
Research in Higher Education._
Review of Higher Education.
Teaching In Higher Education.

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