



ASSOCIATION OF
ATLANTIC
UNIVERSITIES

L'ASSOCIATION DES
UNIVERSITÉS
DE L'ATLANTIQUE

The Atlantic Provinces:

A Knowledge Economy Dropout?

A submission to the

**Federal Liberal Atlantic
Caucus**

by the

**Association of Atlantic
Universities**

November 30, 1999

Atlantic Canada: A Knowledge Economy Dropout?

Will Atlantic Canada be part of the knowledge economy of the next century? Or will we be left behind? Will our children and grandchildren be able to find employment and opportunities in Atlantic Canada? Or will many of them have to leave our region to make their lives elsewhere? The answers to these questions will become known shortly.

The advent of the knowledge economy holds great promise for our region. Economic growth is no longer dependent upon population size and proximity to major markets. But we won't be able to catch up to the leaders in the knowledge economy simply by working harder, longer or faster. We must work smarter. And "smart" costs money. It means investments in education, research and innovation. That's where this region is in difficulty. While the rest of the world has been investing heavily to secure its future, Atlantic Canada is stalled -- and will soon find itself going backward, unless remedial action is taken.

The federal government has recognized the vital importance of knowledge capacity to Canada's future. It is to be applauded for doing so. But capacity-building initiatives designed with other regions in mind may not work for Atlantic Canada. The Government of Canada must ensure that Atlantic Canadians and their universities can compete

on a level playing field, notwithstanding the limited fiscal capacity of their provincial governments. We need effective federal policies that address the competitive disadvantages arising from our inadequate industrial and academic infrastructures and the unintentionally negative impacts of recent federal programs. Only the federal government has the means at the moment to offset provincial limitations and facilitate regional growth. If it does not do so, other regions will grow even wealthier and stronger, while ours will drop out of the knowledge economy -- and fall further and further behind.

This brief recommends immediate federal action along three lines.

- 1 The Government of Canada should help ensure that Atlantic universities are competitive in KNOWLEDGE CAPACITY with universities elsewhere, notwithstanding the four provinces' small industrial base and their governments' daunting fiscal constraints.**
- 2 The Government of Canada should assist Atlantic universities to BUILD UPON DISTINCTIVE STRENGTHS that complement and support the region's growing knowledge-based sectors.**

These two initiatives will require an investment in the Atlantic university

sector of approximately \$500 million over 5 years.

3 The Government of Canada should REINVEST IN HIGHER EDUCATION through the Canada Health and Social Transfer.

As recognized in the recent report, "Atlantic Canada: Catching Tomorrow's Wave", universities serve as motors of development in today's economy. They give young people the knowledge and skills needed for successful careers, attract people and investments, and fuel the growth of new industries, expanding the economy beyond the traditional industries of the past. Atlantic Canada's universities should -- and can -- be the key to prosperity for our region in the knowledge economy. But our universities are in trouble. Unless they are given the ability to compete, they will be unable to support regional growth as identified in "Catching Tomorrow's Wave".

In the next few pages, we address how universities contribute to the well-being and prosperity of our people. We look at how they could and should fuel the competitiveness and prosperity of our region in the knowledge economy. We outline our current predicament and identify the crucial challenges we must surmount to fulfill these expectations. Some of these challenges derive from provincial policies and we are address-

ing them with provincial governments. Others, however, invite strong action by the Government of Canada and we have several important recommendations for immediate action.

Investment in our Universities: Investment in our Youth

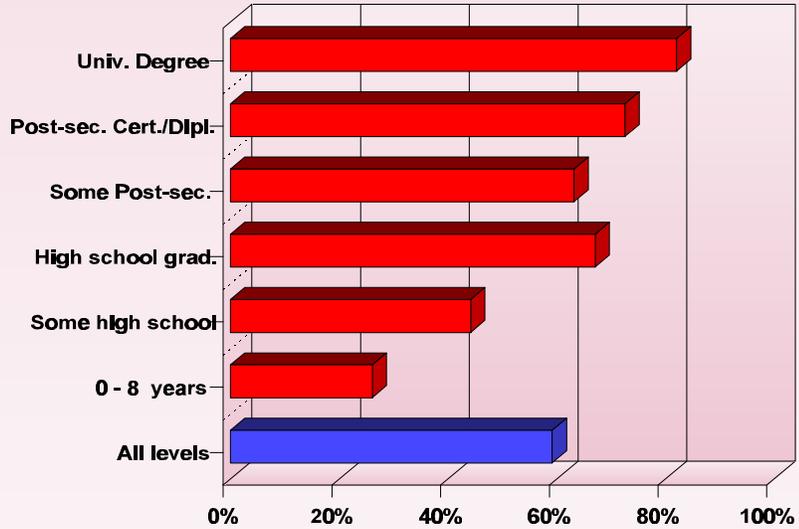
The best investment a young person can make in his or her own future is to pursue additional schooling, the more the better. As **Figures 1, 2 and 3** demonstrate, university graduates are more likely to seek employment than any other group in society and most likely to secure good jobs. They also earn the highest incomes.

Figure 3 shows dramatically that, not only is initial employment income tied directly to educational levels, lifetime career opportunities are also tied to educational background. While high school and community college graduates face a future of relatively flat income potential after their initial start in the workforce, university graduates have shown sustained income growth over their working lives. For any young person with the aptitude, the question of what path to choose is clear. Our governments must make it a priority to ensure that our children and grandchildren have access to high-quality university education in our region.

Figure 1

Highly educated people participate most actively in the workforce

Labour force participation rates by educational attainment, Atlantic Provinces, 1998

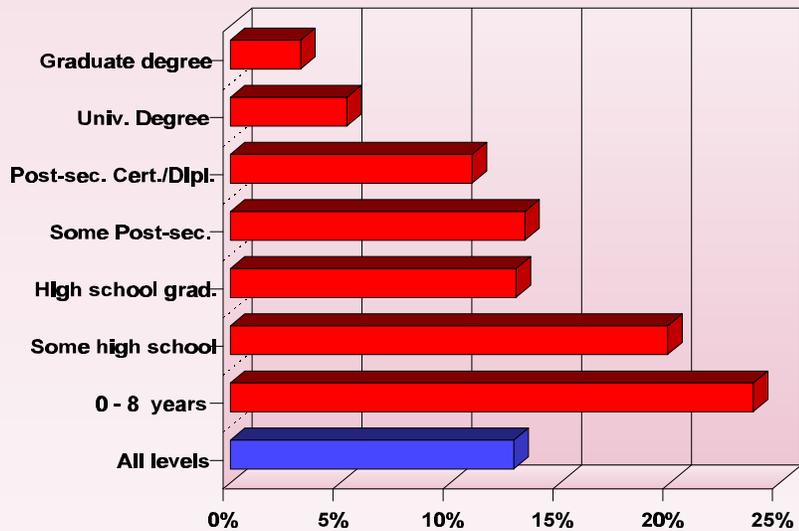


Source: Statistics Canada

Figure 2

A university education means more certain employment

Unemployment rate by level of education, Atlantic Provinces, 1998

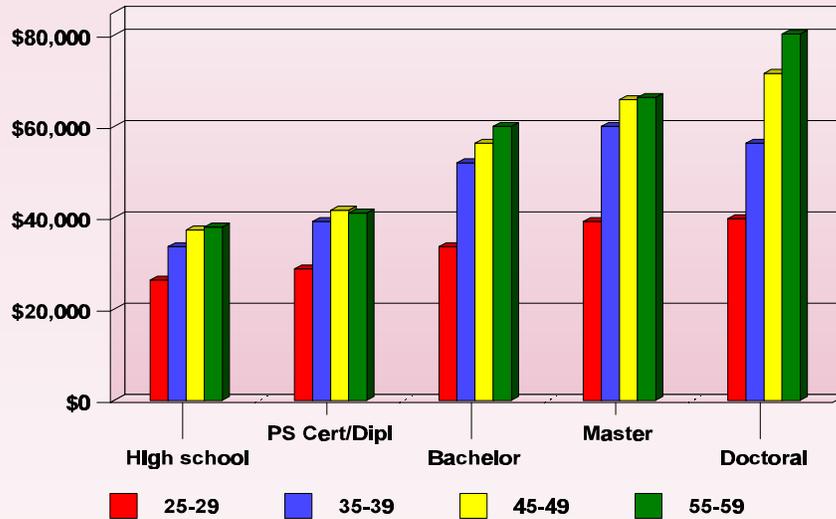


Source: Statistics Canada

Figure 3

University education means better life-time income prospects

Annual income by level of education and age, Canada, 1996



Source: AUCC/
Statistics Canada

Universities and the Knowledge Economy

With the advent of the knowledge economy, universities play an even greater role in individual and social prosperity. The next five tables provide clear evidence of our re-orientation towards the knowledge economy, its impact on our labour market and our capacity to enjoy a more prosperous future.

Figure 4 shows how the labour market in Canada is changing, as the high growth sectors in our economy increasingly require workers with a university education. **Figure 5** shows the impact of these changes in Atlantic Canada, as an example. During the nineties, all of the

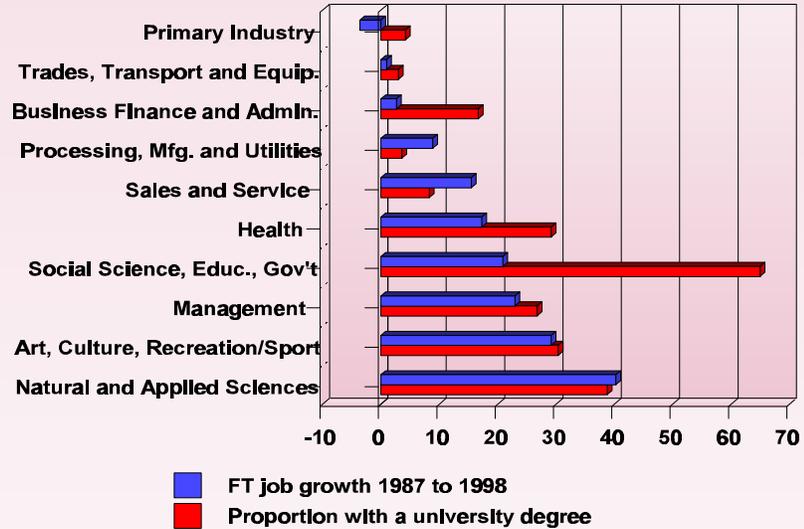
net growth in our labour market has gone to post-secondary graduates. **Figure 6** shows the trend for future jobs in Nova Scotia, as predicted by Human Resource Development Canada, pointing once again to the central importance of a high-quality, university-educated work force. University graduates therefore provide the essential foundation for future prosperity in Atlantic Canada.

Since the new economy grows not only through higher education of the labour force, but also by capitalizing new ideas with commercial potential, it is also critical to sustain our ability to generate new ideas. This relates directly to the research and development activities of our universities.

Figure 4

The fastest growing occupations require the most education

Sectoral growth and knowledge requirement, by occupation category

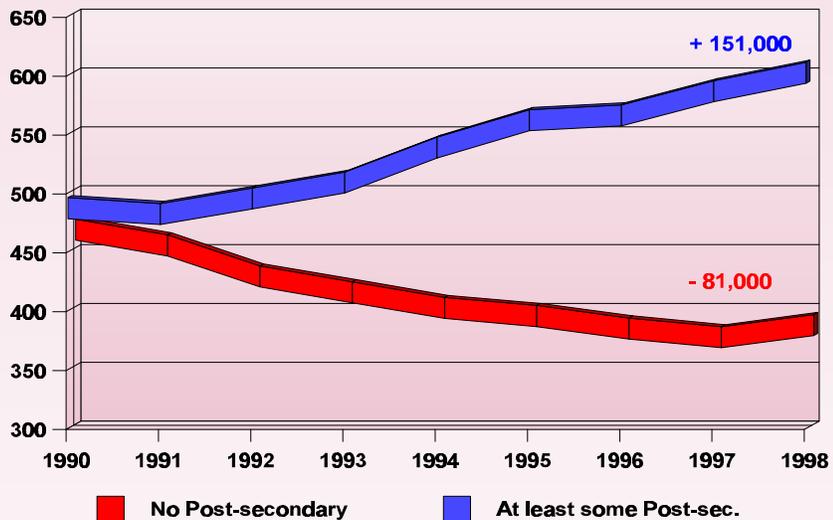


Source: AUCC

Figure 5

Jobs for highly educated people are growing

Employment levels in the Atlantic Provinces, by level of education



Source: APEC/
Statistics Canada

Figure 6

Knowledge jobs dominate the future labour market in Nova Scotia

Fastest growing occupations, 1998 Nova Scotia Occupation Forecast (numbers of jobs)

| | 1998 | 2003 | % Change |
|---------------------------------------|-------|-------|----------|
| Computer Programmers | 1,660 | 2,260 | 36.1 |
| Computer Systems Analysts | 1,810 | 2,410 | 33.1 |
| Electronic Assemblers and Testers | 530 | 700 | 32.1 |
| Info Systems & Data Proc. Managers | 630 | 800 | 27.0 |
| Computer Engineers | 310 | 390 | 25.8 |
| Bus. Services to Management | 750 | 930 | 24.0 |
| Industrial and Manufac. Engineers | 250 | 310 | 24.0 |
| Other Business Managers | 490 | 580 | 18.4 |
| Finance and Investment Analysts | 170 | 200 | 17.6 |
| Graphic Design & Illustration Artists | 970 | 1,140 | 17.5 |
| Tech. Sales, Wholesale Trade | 1,850 | 2,160 | 16.8 |
| Inspectors in Public & Env. Health | 430 | 500 | 16.3 |
| Managers in Health Care | 680 | 790 | 16.2 |
| Specialists in Human Resources | 610 | 700 | 14.8 |

Source: Planning and Evaluation, HRDC Nova Scotia

Given the limited numbers of large firms with active R&D efforts in the Atlantic region and the inability of most small and medium-sized firms to afford such programs, it falls to our universities to carry a substantial portion of the region's R&D efforts. **Figure 7** shows that Atlantic Canada depends to an unusual degree on its educational institutions for R&D in comparison with the rest of the country. Our universities hold the key to the development of knowledge-based industry in Atlantic Canada.

Can Our Universities Meet the Challenge?

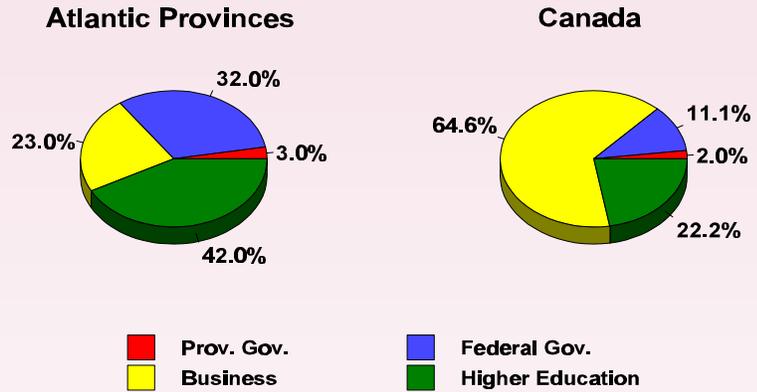
A traditional economy invests in its resource base, but in a knowledge economy it is critical to invest in brain power. How has Atlantic Canada been doing in this regard? The answer is not very encouraging.

As **Figure 8** indicates, a number of the region's provincial governments have had difficulty in supporting the full scope of university education within their jurisdictions. As measured by operating grants per student, Nova Scotia trails the country and New Brunswick ranks only seventh. (The high value for PEI reflects the presence of the regional veterinary college in that province.)

Figure 7

Most R&D in Atlantic Canada is carried out by universities

R&D by performing sector, Atlantic Provinces and Canada

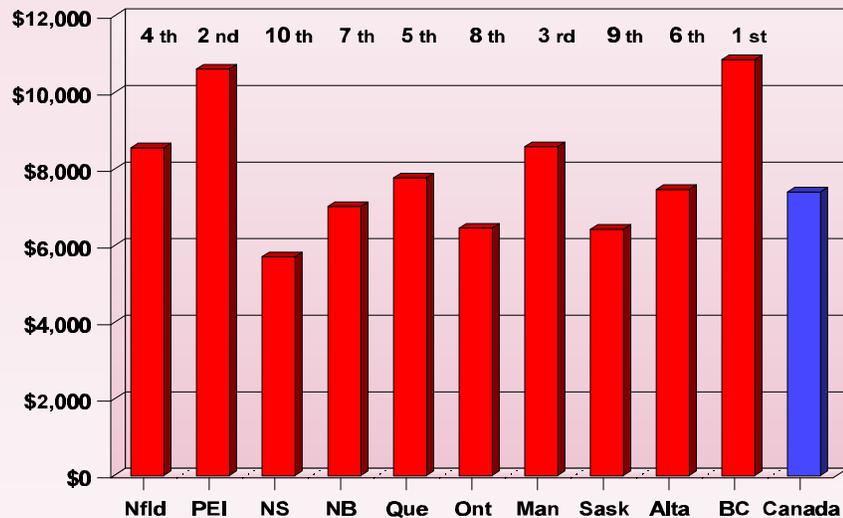


Source: Statistics Canada

Figure 8

Funding per university student is low in some Atlantic provinces

Provincial university operating grants, \$ per student, 1997-98



Source: CAUBO & Statistics Canada

However, raw figures can be deceiving. Nova Scotia's universities attract a large influx of students from other provinces, some under Atlantic regional funding arrangements, but many more (close to 4,000 annually) which are unrecognized in any fiscal arrangement, either inter-provincial or federal. If an adjustment is made to the student numbers to remove this unfunded inflow, Nova Scotia's funding per student, while still at the lowest level, is comparable to that in Ontario and Saskatchewan. Thus, lack of government funding for out-of-province students exacerbates the financial difficulties of universities in Nova Scotia.

With respect to research capacity, the region's situation is even worse. **Figure 9** shows that the Atlantic provinces lag well behind the other provinces in Canada in support for research and development activities, spending well below the national average. Industry also spends little on R&D in the region. **Figure 10** shows the cumulative effect of these policies -- low levels of total R&D expenditures that leave our region far behind the rest of Canada.

What are our universities' prospects for the future?

If the present is not encouraging, the future is positively alarming. A large threat lies ahead. During the next decade, Ontario and Western Canada anticipate a huge growth in university

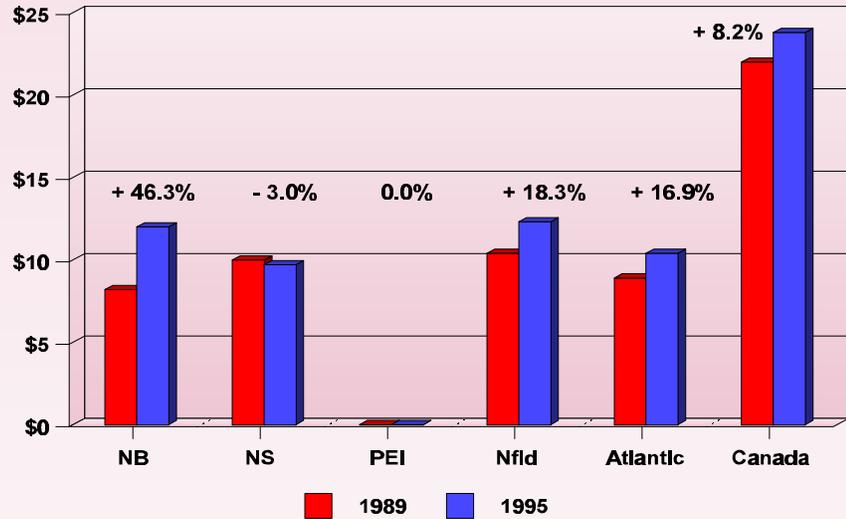
enrolments (125,000 more students) as a result of demographic changes and increased university attendance rates. At the same time, they also face a large turnover in faculty as their baby boom professors retire. Rising enrolments and faculty renewal will lead to a tremendous surge in the job market for professors. It is estimated that there will be 32,000 faculty positions advertised over the coming decade. (For purposes of comparison: there are currently 33,000 full-time faculty members in Canada!) Atlantic Canada's best university teachers and researchers inevitably will be targeted for attractive offers to leave for provinces that choose to spend more on their universities. We'll also find it difficult to attract young scholars here when we have openings. Given our poor record of support for core university operations and research activities, as well as the steady deterioration of our campus facilities, it will be hard to put together competitive offers.

Recent federal policies that have the effect of concentrating substantial new research investments in the larger universities in the central and western universities also exacerbate this problem. Without preventative action, we will soon see a renewal of the old "going down the road" syndrome, but with one important difference: it won't be the unemployed and the least prepared who flock to more competitive areas, it will be our best prepared and most able citizens who flee to regions that provide manifestly better opportunities.

Figure 9

Atlantic governments lag behind others in research spending

Provincial government expenditures on R&D, \$ per capita

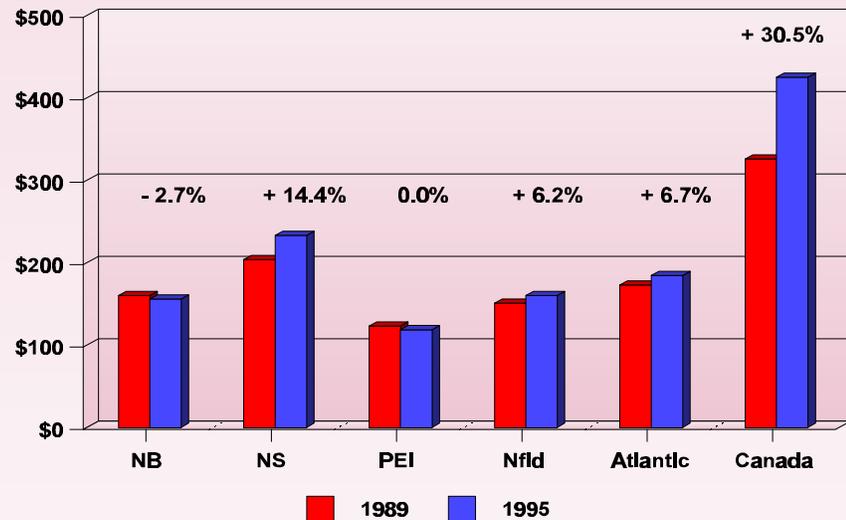


Source: MPHEC/ Statistics Canada

Figure 10

Atlantic Provinces have low levels of total R&D expenditure

Total expenditures on R&D, \$ per capita



Source: MPHEC/ Statistics Canada

Faced with a deteriorating university system unable to offer the highest quality education, what choice will our children have but to look elsewhere. The resulting “brain drain” will hurt our region as much as it impairs our universities.

It is ironic that the positive efforts of the Federal Government to address our national R&D problem should have such negative effects. But it is very clear that Atlantic Canada does not receive a proportional share of federal research funding.

Figure 11 shows the outcome of the first stages of the distribution of funds by the Canada Foundation for Innovation. Given the inability of the Atlantic provincial governments to provide further matching funds to secure these grants, we must anticipate that the ultimate disposition of the remaining CFI funds will flow almost exclusively to the Central and Western provinces.

Figure 12 shows a similar disposition of federal R&D funding to university researchers. These expenditures fuel applied research with immediate commercial potential as well as basic research that lays down the intellectual foundation for new developments in our understanding of how and why the world works as it does. They also help support our universities, enabling the creation of new jobs for highly trained research personnel and purchases of specialized equipment that are used in university labs by students and faculty, as well as by private sector firms needing access to

such unique tools. These funds, in short, are our lifeline to the future. But our underfunded provincial universities, lacking core operating budgets and supported by only minimal provincial investments in research, find it increasingly difficult to compete effectively with much better funded universities elsewhere.

By any measure, Atlantic Canadian universities and researchers get a much smaller proportion of federal funding than the regional population, student enrolments or faculty numbers would seem to warrant. The explanations for this outcome are complex, but the outcome and its consequences are clear: we don't get sufficient research grants, we don't get sufficient infrastructure funding through programs like CFI, and to the extent that the distribution of the latest federal initiative, the 21st Century Chairs in Research Excellence, is based on existing patterns of grant funding, we will not get much on that account as well. It is not surprising that in Atlantic Canada renewed federal interest in R&D issues is regarded as a mixed blessing – producing the perverse result that a long overdue policy initiative will likely lead to the loss of our very best researchers.

..Atlantic Canada's “brain drain”

The consequences of the “brain drain” will reach far beyond the universities. Good professors attract excellent students, especially in technical fields

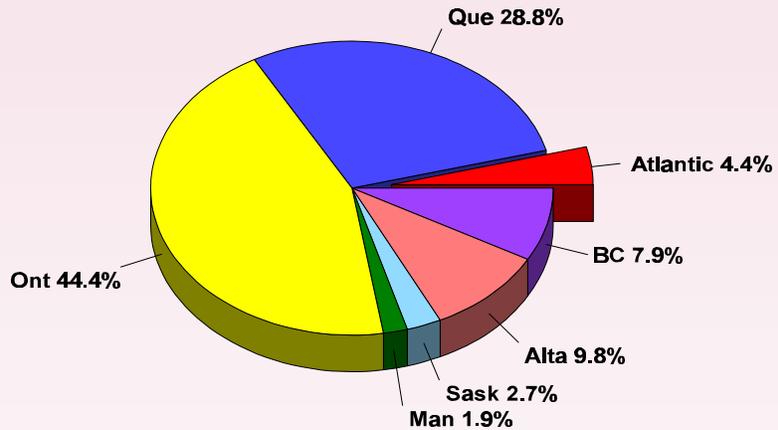
Figure 11

Atlantic Canada is missing crucial research opportunities

Distribution of CFI funding by province, as of October 1, 1999

Atlantic Canada has 7.8% of the Canadian population

Total funding *: \$375 million



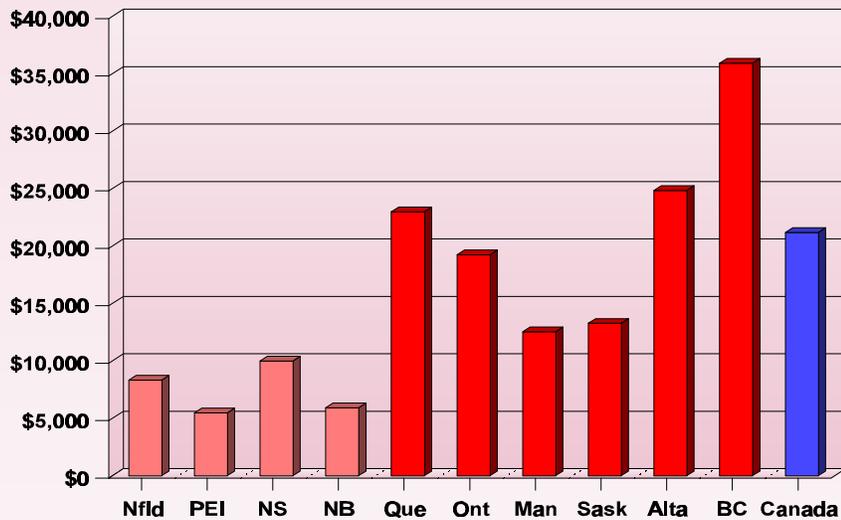
Source: CFI

* Excluding national projects

Figure 12

Atlantic universities receive proportionately less federal R&D funding

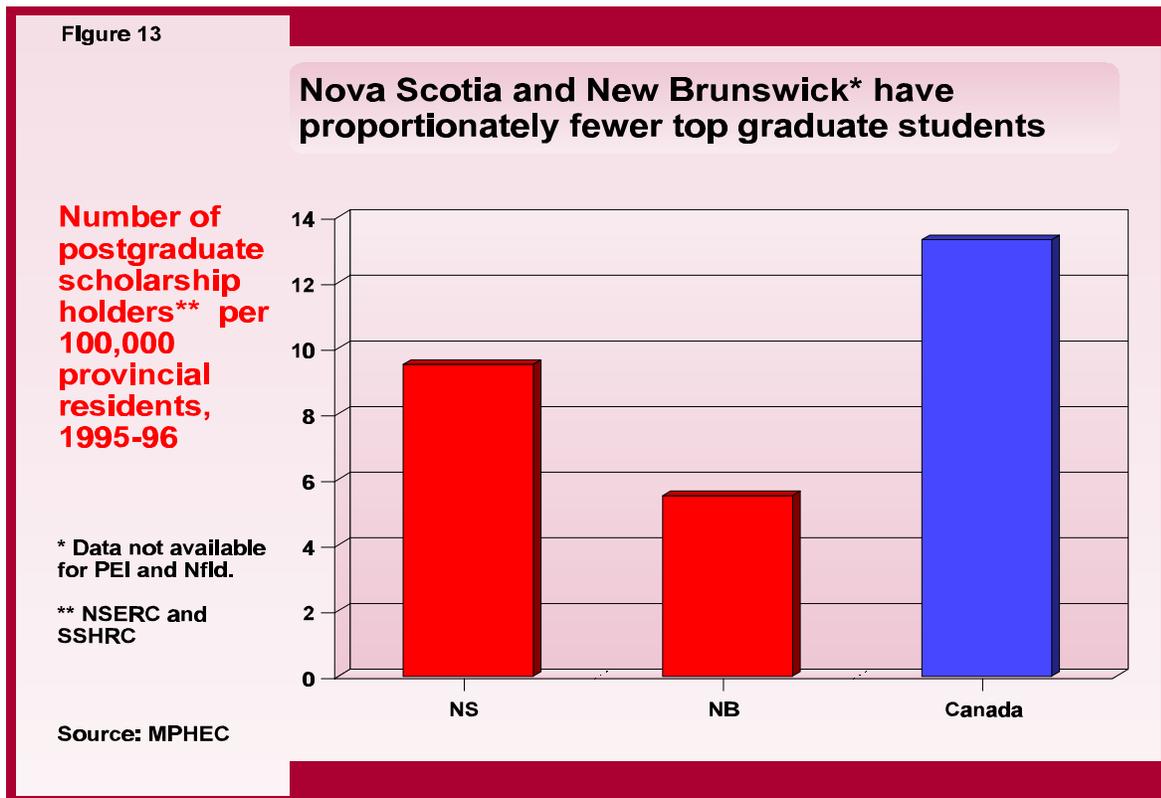
Federal R&D funding to Canadian universities, by province, \$ per FT Faculty, 1995-96



Source: MPHEC/ Statistics Canada

requiring advanced study. Already, Atlantic Canada has a problem competing effectively to attract the best graduates into our research labs and graduate seminars, as **Figure 13** shows. (This is another example of the negative impact on the Atlantic region of otherwise excellent federal policies.) Students who study here tend to stay on and work in our region. A survey of recent graduate students found that 86 per cent who completed their degree at a Maritime university remained to work in the region, mostly in the private sector. Adding this fact to the brain drain equation leads to a chilling conclusion: the loss of our best professors will cost us

our ability to encourage the brightest graduates to take an advanced degree here, and this in turn will cut off the flow of talented people into the local economy. Once the brain drain gathers force, the downward spiral will flatten our knowledge economy, too. Our brightest men and women expect and need a university education that meets the highest national standards, both at the undergraduate and graduate levels, and if it appears that they cannot get it here, they will have little choice but to leave. The fact that this is partly the product of federal policies designed to encourage national economic growth is particularly disturbing.



It's easy to paint depressing scenarios, but are they realistic? Imagine for a moment the future of our emerging biotech industries without strong university research support and well qualified graduates to staff the new start-up firms. Impossible. The same holds true for the information technology field. It's no accident that Silicon Valley emerged from an area that boasts some of the best universities in the world.

The same conclusion applies to our region's new oil and gas industry. It's not enough to secure pipeline construction jobs and government royalties to build a prosperous future based on this new source of wealth. We must also ensure that the "smart" jobs spun off by the primary industry into high-tech suppliers, environmental and engineering consulting companies, management firms, shipping companies, IT companies, legal and accounting services, and the like stay in the region and don't leak outside to distant suppliers. That would constitute another kind of brain drain. These jobs require a university-educated work force. Allied R&D activities are also required. Can we sustain this vision without a first-rate university system?

Where do we go from here?

The whole thrust of the regional development strategy proposed in "Atlantic Canada: Catching Tomorrow's Wave" is to invest in our people to establish the long-term capacity to succeed in the knowledge economy. Virtually every industry identified as a likely prospect

for future growth rests upon a strong knowledge base. As the report notes, "the critical infrastructure for these new industries is not physical, but intellectual; it is the quality of the minds and the education that is the true necessary infrastructure today. We believe that education and training of our young people - and indeed, developing life-long learning models - should be viewed as an essential investment in our economic infrastructure, no less than investment in fibre optic networks." Universities are a crucial part of that infrastructure. Our young people require intellectual challenges developed in a milieu that not only gives them the best teachers but also the best infrastructure so that they are as competitive as young people from other regions of the country.

Atlantic Canada can be competitive and prosperous in the knowledge economy of the next century -- but not without strong universities.

Unless the federal government ensures that the region's universities are competitive - in spite of the provinces' fiscal limitations - the universities will not be able to play the roles they can and should in building a knowledge-based economy.

We applaud the new emphasis in recent federal budgets on building up our national R&D capacity. Initiatives like the Canada Foundation for Innovation, increased funds for our national granting councils, the Millennium Scholarship program and the recently an-

nounced 21st Century Chairs for Research Excellence will all make a huge difference to Canada's capacity to keep up and move ahead in the knowledge economy. But as we have seen, these programs do not fully address the problems of our region. Indeed, in some cases, they make our difficulties more intense since, unintentionally, they have created the preconditions for a massive "brain drain" from East to West.

What can the Federal Government do to build a knowledge-based economy in Atlantic Canada?

In taking up this question we are mindful of the realities of federal-provincial relations and constitutional requirements. Our recommendations are couched within the framework of the Federal Government's current fiscal capacity and constitutional prerogatives. In each case, however, we wish to underline the importance of full (100%) funding for program initiatives created by the Federal Government. As we have seen too often, our provincial administrations and small scale private sector simply do not have the ability to support matching grants programs.

First, the Government of Canada can help ensure that our universities are competitive in KNOWLEDGE CAPACITY - in their capacity to attract and keep top professors and students --

- **Ensure that Atlantic universities are not precluded from participation**

notwithstanding the four provinces' small industrial base and their governments' daunting fiscal constraints. We propose the following specific initiatives:

- 1 The federal government should ensure that our universities are able to participate fully in **Research Capacity-Building**. At this point in the transition to a knowledge economy, it is vital that Atlantic universities not be shut out of key federal research initiatives. Specifically, the federal government should:

- **Create a regional equivalent of the 21st Century Chairs for Research Excellence to build the basic academic capacity of our institutions.** We have many fine undergraduate universities in our region that will receive scant results from the existing national program, given its focus. Even our few research-intensive universities will receive minimal support from the national program since, as we have seen, they have difficulty competing for research grants in an environment where the rules favour the big and the rich. It is essential that we sustain the core institutions responsible for building the human capital of our region. This recommendation, more than any other policy change, will offset some of the unintended negative consequences of existing research initiatives sponsored by the federal government.

in the Canada Foundation for Innovation program because of lack of

“**matching funds**”. Our region’s university research capacity is a cornerstone of its future economic growth. To deny our universities the opportunity to build capacity through programmes such as the Canada Foundation for Innovation would be to relegate the Atlantic region to permanent ‘have not’ status. Instead, the federal government should seize upon redistribution of knowledge capacity to less developed parts of the country as an opportunity to overcome historic economic disparities and achieve future self-reliance. Providing matching funds for successful proposals to the Canada Foundation for Innovation is an essential element of this strategy.

2 The federal government should invest in **Atlantic Knowledge Infrastructure**. Specifically:

■ **Information Technology Infrastructure.** With the right infrastructure, Atlantic universities can fuel the growth of the region’s emerging IT-based industries through leading-edge education, research and knowledge transfer. As recognized in “Catching Tomorrow’s Wave”, the IT sector in Atlantic Canada is “in prime condition for development”. Universities can fuel this development by providing graduates with the most advanced knowledge and skills, by collaborating with knowledge-based companies in the region, and by attracting new activity and investment to the region. First class university IT infrastructure is critical to make this

happen.

■ **Teaching and Research Facilities.** An infrastructure renewal program, whether focussed on academic institutions alone or more generally, will enable us to rebuild our physical capacity to offer the innovative educational and research programs that will sustain our economic future. Our universities have been compelled to deal with ongoing cuts to their operating budgets over the past decade by deferring necessary repairs to their physical plants in order to use their reduced funds to maintain the quality of their academic programs. As a result, they face a very large and growing facilities renewal problem. For example, the price tag is estimated to be well over \$400 million for the region as a whole. The Canada Foundation for Innovation was created to address some aspects of this problem, but, as we have noted already, our region has received limited support from this initiative. This must be corrected if we are to avoid the impending “brain drain”. We must be able to offer attractive and productive working environments to researchers and students whom we wish to keep or bring to work in Atlantic Canada, or we will fall even further behind in the knowledge economy.

■ **Residential Infrastructure.** The federal government should establish a program of very low-cost mortgages to support the construction of new residences and the renovation of

existing residences. There will be increasing demand for new spaces in our region's universities. To accommodate this demand we need additional housing capacity. This capacity will also enable us to serve regional students' needs better. (In some cases, it should also be noted, these residences also support the local tourist industry which looks to our universities to attract major conferences in the summer months and to offer low-end accommodation that is non-competitive with private sector suppliers.)

The infrastructure renewal programs will have a double-barrelled impact. They will immediately stimulate the local construction sector across the region and create a host of jobs and economic benefits for the region. In the longer term, of course, they will build capacity within our region to maintain a competitive university system capable of sustaining the region's economic progress.

- 3** The federal government should encourage advanced study and research at our region's universities by creating a new program of **Atlantic Graduate Scholarships**. With an important difference of emphasis, this would be a graduate-level equivalent of the Millennium Fund. Our region's universities have difficulty competing for good graduate students because the wealthier Central and Western provinces have provincially-funded graduate scholarship programs that we simply cannot match. Moreover, as

we have seen, we receive a disproportionately small number of graduate scholarships from our national granting councils. At the same time, we know that graduate students who stay in or come to our region to study are more likely to remain here to work.

Second, the Government of Canada should assist Atlantic universities to BUILD UPON DISTINCTIVE STRENGTHS which complement and support the region's growing knowledge-based sectors. "Catching Tomorrow's Wave" identifies information technology, oil and gas, geomatics, aquaculture, health, oceans, food, biotechnology and environmental technologies as industrial clusters with particular potential for development. Each of these sectors is fuelled - with highly-qualified employees, with technology, with information and ideas - by corresponding teaching and research in the region's universities. By investing in the universities, the federal government would propel the growth of these knowledge-based sectors.

Third, the federal government should REINVEST IN HIGHER EDUCATION. Recognizing that cutbacks in federal transfer payments in support of post-secondary education have played a role in declining core budgets, the federal government should reinvest in the Canada Health and Social Transfer (CHST) for the support of post-secondary education in the year 2000 and enact staged increases in future years.

Between 1994-95 and 1998-99, cash transfers under the CHST decreased by \$6.2 billion. Assuming that the post-secondary education component of the CHST is approximately 30%, the impact of the cuts to transfers for post-secondary education are now over \$2 billion per year. These cuts have hit the four Atlantic provinces hard: cuts in Newfoundland are \$46 million; in Nova Scotia, \$62 million; in Prince Edward Island, \$9 million, and in New Brunswick, \$50 million.

The impact of these cuts on the universities is profound. They seriously undermine our ability to ensure accessibility for all qualified students, to deliver high-quality education, and to ensure necessary research capacity. All three of these elements – accessibility, quality, and research capacity – must be strengthened if Atlantic Canada hopes to diversify and compete in an economy based on knowledge and innovation.

The Way Ahead

In its latest university issue, Maclean's Magazine noted that "for the first time in years, there is a strong consensus that universities are critical – perhaps pivotal – to the country's future success. Finally,

the light bulb has gone on: in a tough global marketplace, knowledge is the capital on which both companies and countries compete, and Canada cannot afford to outsource knowledge development." If this is true for Canada, it is doubly so for Atlantic Canada.

In the knowledge economy, economic competitiveness requires competitive universities. Unless action is taken, Atlantic Canada's universities are unlikely to remain competitive. If the universities lose their best professors, they will lose their best students. The quality of education in Atlantic Canada will drop. Research and technology transfer will dry up. The quality of the work force, the level of business development, the growth of employment -- all will be negatively affected.

Fortunately, action by the Government of Canada as proposed in this brief can prevent this scenario from unfolding. With appropriate intervention now, the universities can unlock the potential for economic and employment growth -- for regional competitiveness and self-reliance -- through knowledge.



