Bridging the Aboriginal Education Gap in Saskatchewan

by Eric Howe

GABRIEL DUMONT INSTITUTE
of Native Studies and Applied Research
www.gdins.org

Successful schooling and permanent employment translate into more income, healthier lifestyles, independence and increased self-esteem. Jobs today require more schooling than when our fathers worked in the bush or on the farm. We must train our children for the jobs of the future by providing them with the knowledge, skills and experience which they need, in ways that enhance their Métis identity. Our goal is to prepare them to be strong, proud and independent Métis citizens.

~Towards Self-Government: a Mandate for the Nineties

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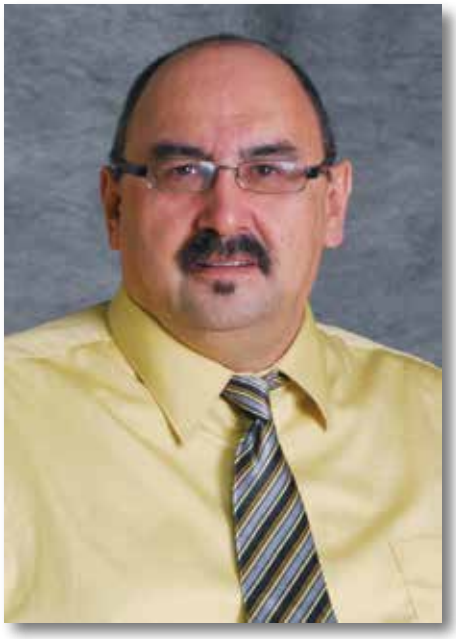
Introduction

Message from the Vice Chair, Gabriel Dumont Institute Board of Governors



Glenn Lafleur, *Vice Chair*
GDI Board of Governors

As Vice Chair of the Gabriel Dumont Institute (GDI) Board of Governors I am pleased to accept the enclosed three-part report by Eric Howe for the Institute. The three reports, taken together, paint a compelling economic picture for bridging the Aboriginal education gap in Saskatchewan and for the success of GDI's teacher education program.

Eric Howe is a well-respected Professor in the Department of Economics at the University of Saskatchewan. He has been writing and publishing on the topic of the economic impact of Aboriginal education and employment for a number of years. As such, GDI engaged Professor Howe to conduct research into the impacts of the Saskatchewan Urban Native Teacher Education Program (SUNTEP), the longest running and only permanent professional degree program of GDI.

The report title, *Mishchet aen kishkayhtamihk nawut ki wiichiihtonaan: Bridging the Aboriginal Education Gap in Saskatchewan*, begins with a Michif phrase which means "The more knowledge we have the more we help one another." We chose this title to honour our Métis heritage language, and our Elders, the traditional knowledge keepers, who have taught us that learning, sharing knowledge, and helping one another is a cherished traditional value.

Part I of the report outlines lifetime earnings in Saskatchewan by level of education. There are Aboriginal/non-Aboriginal education gaps at all levels of education—high school, post-secondary non-university, and university. As one would expect, an increase in education increases lifetime earnings, regardless of race or gender; however, Howe's report demonstrates that the financial rate of return for education is greater for Aboriginal peoples. Without an education, Aboriginal people earn dramatically less than non-Aboriginal people, but with an education, Aboriginal earnings increase more because they largely catch up with non-Aboriginal earnings. In addition, gender is significant: women have a higher financial return from education than men, and Aboriginal women more so, for the same reason.

Part II of the report outlines what it would take to bridge the Aboriginal education gap and asks the pertinent question, "How much is Saskatchewan's economy wasting because of the Aboriginal education gap?" Howe shows the individual and social benefits of bridging that gap. Individual benefits are discussed in two broad categories: monetary (e.g., higher incomes) and nonmonetary (e.g., greater job satisfaction, improved health). Howe is able to apply peer-reviewed economic formulas to both of these categories to determine a dollar figure for both monetary and nonmonetary individual benefits. As for social benefits, Howe demonstrates these by calculating, in economic terms, the benefits of increased tax revenues, lower dependence on social programming, indirect economic benefits, and so on. The numbers are large and persuasive. To put the findings into context, Howe notes that the economic benefit of closing the Aboriginal education gap in Saskatchewan amounts to 20% more than all sales of potash in the history of Saskatchewan.

Howe turns his attention to the economic benefit of 975 SUNTEP graduates, applying the formulas specifically to this group. Furthermore, the effects of SUNTEP graduates on the educational attainment of Aboriginal students are organized into high, medium, and low scenarios and an economic calculation determines a correlating dollar amount. Howe is able to determine the combined benefits, in dollar amounts, of the SUNTEP graduates both collectively and individually. While Howe concedes that many readers will be surprised at the size of the of the per-student benefit, he notes that the numbers are low in that they actually leave out a large portion of the benefits of SUNTEP graduates.

Part III of the report provides a summary of Parts I and II and then provides as an addendum with additional details on a macroeconomic analysis of "the first ever made-in-Saskatchewan boom." Howe makes the compelling case that unlike past economic booms in Saskatchewan that have resulted from natural resources or technological innovation, improving Aboriginal education attainment will result in a made-in-Saskatchewan boom that will have greater permanence.

In this section, Howe looks more closely at the economic impact of SUNTEP, including the effect it has on increasing provincial Gross Domestic Product (GDP), the revenue of the provincial government, and personal incomes. He emphasizes that the economic impact reported is only for the 975 graduates thus far and for the work they have performed thus far. If their future work, or the work of future SUNTEP graduates were taken into account, the numbers would be much larger.

Research has shown that education is the most important determinant of labour market outcomes and also plays a key role in improving both individual and societal outcomes. Howe surmises that although the size of the Aboriginal education gap is large and will take decades to bridge, it would have been larger without the contributions that SUNTEP has made by graduating 975 Aboriginal teachers.

It is my hope, and the hope of the GDI Board of Governors, that the information in these reports be widely disseminated and discussed and serves as a catalyst for policy review and development at all levels. As Howe notes in his report, "Society is wasting a valuable resource." The evidence is clear: closing the Aboriginal education gap will benefit not only the Aboriginal population but also provincial and local governments, businesses, and by extension, the whole population of Saskatchewan.

Glenn Lafleur
Vice Chair
GDI Board of Governors

About GDI

In 1976, a group of Métis and Non-Status Indian citizens were concerned about the inequitable education and employment levels of Métis and Non-Status Indian people in Saskatchewan. They expressed a desire to own an institution of their own that would provide future generations with access to quality education in a Métis (and a Non-Status Indian) cultural context.

Based on these early discussions, the Gabriel Dumont Institute of Native Studies and Applied Research Inc. (GDI) was formally established in 1980 with funding from the Government of Saskatchewan. After the political split between the Métis and Non-Status Indians occurred in 1988, the Institute became an exclusively Métis educational and cultural institution.

From its humble beginnings, the Institute has steadily grown to become the continent's most notable Métis educational and cultural institution. The composition of basic education, technical training, university, publishing, and human resource development programming has made GDI a dynamic and unique institution.

GDI's mission:

To promote the renewal and development of Métis culture through research, materials development, collection and distribution of those materials and the design, development and delivery of Métis-specific educational programs and services.

Part I: The Impact of Education on Earnings

Read the First Two Sections of This Paper, Even if You Skip the Rest

There are many good reasons to not begin a report with a personal anecdote. Here goes, anyway … Although I do not recall the specifics of most conversations with my parents, I remember one in detail even though it happened decades ago. I was about to graduate from high school and had decided to not continue my education: my future would not include either university or technical school. I informed my parents of this decision that evening as we were getting up from dinner. They sat me back down with a firmness that should have been a warning. Confidently, I continued. I explained that I wanted to get on with my life. I pulled all the stubbornness levers that always worked on my parents. I also reminded them that they wanted me to marry my girlfriend and start producing grandchildren. My parents figuratively threw the levers back in my face and displayed a level of resolution that reminded me who I had inherited my stubbornness from. I was informed—in very certain terms—that I was not stopping my education with high school. My father insisted that I at least had to try, even if trying lead to failure. Subsequently, I found myself deeply grateful for my parents' stubbornness.

Today, decades later, it would seem that the critical importance of education should be patently obvious. This is the Information Age, when people get paid largely on the basis of what they know. So education should be widely understood to be crucial. However, I have spent enough time talking to people to know that the financial importance of education is not obvious to many. In this context, even apparently knowledgeable adults have confidently advanced the most counter-factual, preposterous opinions. Although some are as well-informed as my parents were, many others aren't. Almost no one knows what is on the line financially when educational decisions are made.

If a young person decides to drop out of school, how much does it lower their lifetime earnings?

The purpose of this paper is to provide that information. If a young person decides to drop out of school, how much does it lower their lifetime earnings? How much will they increase their lifetime earnings if they attend university after finishing high school? What about technical school? Young people deserve to know. So do their parents. So do politicians as they make decisions about educational funding and priorities. The analysis will be performed for Saskatchewan residents. The amount of earnings depends on whether the individual is male or female, and also on whether the individual is non-Aboriginal, Métis, or North American Indian.

The financial stakes turn out, in fact, to be large; unexpectedly large to most. Not surprisingly, the most common question to arise in discussions of these points has been about stories in the media that wage rates are stagnant (or even declining!) in Canada. To the contrary, the average real annual wage rate per employee in Saskatchewan has been increasing by 1.0% per year since 1990 and by 1.6% per year since 2000. (Note that this is real and expressed per employee, so the effects of both inflation and of changes in the size of the labour force are removed.) What about the media stories about wage stagnation? These stories are the result of a spin that satisfies the needs of employers (who find them useful in negotiating with employees) as well as unions (who find them useful in recruiting). When examined in detail, the media stories are usually about a specific stagnant industry—manufacturing is a popular choice—or a geographical area which is dominated by a stagnant industry. The stories typically leave out benefits, which are usually negotiated to increase faster because of their somewhat preferential tax treatment. They do not include professional service sectors, where wage rates are growing particularly robustly. They also leave out the effect of an employer, in effect, giving an individual a raise by promoting them to a better paying job.

The financial stakes turn out, in fact, to be large; unexpectedly large

In fact, the following results should be regarded as lower bounds. The long-term rate of increase in the average real wage rate per employee was set at the lowest plausible value, 0.65%, about two thirds of one percent per year. Rates that are closer to the above rates of 1.0% and 1.6% were deemed to produce lifetime earnings results which—while accurate—many would find implausibly high. (Just as our parents' and grandparents' generations would regard our earnings today as implausibly high.) Consequently, overall wage rates will probably increase even faster than we have assumed, so our estimates should be taken as lower bounds.

How much will future incomes grow? The rule of thumb is that—with economic growth—each generation enjoys a material standard of living that is approximately twice that of their parents' generation, and hence about four times that of their grandparents'. This is making comparisons at the corresponding times of life. Of course, young adults get paid less—and suffer higher unemployment rates—than they will experience later in life, so the appropriate intergenerational comparisons are between how much is made by people of a given age.

The purpose of the following analysis is to predict the lifetime earnings of our six groups of Saskatchewan people (males or females who are non-Aboriginal, Métis, or North American Indians) depending on their educational attainment. Four categories of educational attainment will be used. We will consider people who:

- drop out prior to receiving a high school diploma and do not subsequently obtain high school equivalency;

- obtain a high school diploma either by graduation or by completing high school equivalency, with no further formal education;

- complete a program at a non-university post-secondary institution (e.g., a technical school), with no further formal education;

- or receive a Bachelor's degree or higher.

These computations are done for the lifetime earnings of hypothetical Saskatchewan residents who are fifteen years old in 2011.

The More You Learn the More You Earn, Especially Aboriginal People

Involvement in the labour market—and hence earnings—vary with age. So we will need to examine what happens during an entire working life. The following analysis will focus on individuals beginning at age 15, when Statistics Canada begins to keep track of labour market outcomes. They will be assumed to retire following the usual pattern of retirement. However, they will be numerically forced into retirement at age 70, if they haven't retired before.

How much do they earn? The results are shown in the following three tables. All amounts are measured in constant 2011 dollars, so the effect of inflation has been removed. All amounts are discounted present values. Table 1 applies to non-Aboriginal people, Table 2 applies to Métis, and Table 3 applies to North American Indians.

Table 1. Lifetime earnings for a non-Aboriginal resident of Saskatchewan

	MALE	FEMALE
Drops out of school prior to receiving a high school diploma, and does not subsequently obtain high school equivalency	$693,273	$349,189
Obtains a high school diploma either by graduation or by subsequently completing high school equivalency, with no further formal education	$984,773	$597,140
Completes a program at a non-university post-secondary institution (a technical school), with no further formal education	$1,218,559	$748,057
Receives a Bachelor's degree or higher	$1,577,505	$1,453,503

Table 2. Lifetime earnings for a Métis resident of Saskatchewan

	MALE	FEMALE
Drops out of school prior to receiving a high school diploma, and does not subsequently obtain high school equivalency	$546,671	$260,104
Obtains a high school diploma either by graduation or by subsequently completing high school equivalency, with no further formal education	$975,225	$609,609
Completes a program at a non-university post-secondary institution (a technical school), with no further formal education	$1,242,661	$789,437
Receives a Bachelor's degree or higher	$1,666,032	$1,516,473

Table 3. Lifetime earnings for a North American Indian resident of Saskatchewan

	MALE	FEMALE
Drops out of school prior to receiving a high school diploma, and does not subsequently obtain high school equivalency	$362,023	$202,279
Obtains a high school diploma either by graduation or by subsequently completing high school equivalency, with no further formal education	$796,762	$479,788
Completes a program at a non-university post-secondary institution (a technical school), with no further formal education	$999,511	$757,689
Receives a Bachelor's degree or higher	$1,469,756	$1,382,858

The preceding tables show the effect of sex, Aboriginal identity, and education on lifetime earnings. Examining the tables in detail, note the following.

People who drop out of school should expect to be poor. For example, Table 3 shows that a North American Indian male who drops out of school has lifetime earnings of only $362,023. If he just completes high school his earnings more than double. Similar observations can be made from the other tables for non-Aboriginal people and Métis: dropping out dramatically lowers an individual's standard of living, though it has the greatest impact on Aboriginal people and females.

People who drop out of school should expect to be poor.

Females make less than equally educated males in each of the three tables. For example, a non-Aboriginal high school graduate earns $984,773 if male, but only $597,140 if female.

Non-Aboriginal people earn more than North American Indians for each category. For example, a non-Aboriginal male who gets a bachelor's degree will earn $1,577,505, whereas a North American Indian male who gets a bachelor's degree will earn $1,469,756. The comparison of non-Aboriginal earnings to the earnings of Métis is more complicated: at lower levels of education Métis earn less than non-Aboriginal people, but at higher levels of education they earn more.

Although females make less than males, females have a higher financial return to education than males. The above tables show that education increases earnings, on average, for everyone. But it increases female earnings by more than male. Why is that? Without an education, females earn much less than males, but the earnings difference largely goes away with higher levels of education. Consequently, females achieve a higher financial return because they receive a double benefit from education: female earnings rise with education—just as they do on average for everyone—but they also rise because they catch up with male earnings. Consequently females have a higher financial return to education.

For the same reason, Métis and North American Indians have a higher financial rate of return to education. Without an education, they earn far less than non-Aboriginal people. However, the difference in earnings largely goes away with higher levels of education for North American Indians. The difference in earnings more than goes away for Métis. Métis males make more than non-Aboriginal males with completion of either technical school or university. Métis females make more than non-Aboriginal females at all levels of education except if they drop out. Hence both Métis and North American Indians get a double benefit from education. Their earnings rise with education—just as they rise on average for everyone—but they also rise because they catch up with non-Aboriginal earnings. Consequently both Métis and North American Indians have a higher financial return to education.

Métis and North American Indians have a higher financial rate of return to education. Without an education, they earn far less than non-Aboriginal people.

So, how much money is on the line financially if an individual is considering dropping out before receiving a high school diploma? Table 4 shows the changes in lifetime earnings for an individual who completes high school as opposed to dropping out. Each entry is arrived at from the previous three tables, by subtracting lifetime earnings without a high school diploma from lifetime earnings with.

Table 4. Increase in lifetime earnings from completing high school instead of dropping out

	MALE	FEMALE
non-Aboriginal	$291,500	$247,951
Métis	$428,554	$349,505
North American Indian	$434,739	$277,505

All groups have a lot on the line financially in deciding to finish high school. The average of the entries in Table 4 is somewhat more than a third of a million dollars! Note, however, that Métis and North American Indians have more on the line than non-Aboriginal people. Note that females actually have less on the line than males, though that changes when we consider what happens after high school.

So, what happens after high school? Table 5 shows the changes in lifetime earnings for an individual who gets a high school diploma and then completes a program at a technical school. Each entry is arrived at from Tables 1 through 3, by subtracting lifetime earnings without a high school diploma from lifetime earnings with technical school.

Table 5. Increase in lifetime earnings from completing high school and then going on to technical school

	MALE	FEMALE
non-Aboriginal	$525,286	$398,868
Métis	$695,990	$529,333
North American Indian	$637,488	$555,410

Examine the earnings data in Table 5. The increases for Aboriginal people are greater than the increase for non-Aboriginal people. The increases are still less for females than for males, though that will change with the next table.

What about the choice of university after high school? How does that pay off? That is the subject of Table 6, which shows the changes in lifetime earnings for an individual who gets a high school diploma and then a bachelor's degree. Each entry is arrived at from Tables 1 through 3, by subtracting lifetime earnings without a high school diploma from lifetime earnings with a bachelor's degree

Table 6. Increase in lifetime earnings from completing high school and then going on to university

	MALE	FEMALE
non-Aboriginal	$884,232	$1,104,314
Métis	$1,119,361	$1,256,369
North American Indian	$1,107,733	$1,180,579

Comparing Tables 4, 5, and 6, we see that university is the most financially rewarding single educational decision an individual can make. Note that the increase is higher for females than males because they receive the double benefit from education discussed above: earnings increase both from the usual effect of education but also from catching up with male earnings. Similarly, the increase is higher for Métis and North American Indians than non-Aboriginal people, because they receive a double benefit from education: earnings increase both from the usual effect of education but also from catching up with non-Aboriginal earnings. In fact, the largest two numbers in Table 6 are for the increase in the earnings of female Métis and North American Indians because they receive a triple benefit from education: earnings increase from the usual effect of education, from catching up with male earnings, and from catching up with non-Aboriginal earnings.

An adult, seeing the dollar amounts in Tables 1 through 6, will be struck by their size. However, important educational decisions are made by people long before adulthood.[1] There is a substantial communication problem with young people who—perhaps influenced by media coverage of the earnings of sports and entertainment figures—often unrealistically overestimate their future earnings. So let's make the above amounts more concrete. A customer can expect to pay $52,000 for a new 2011 top-of-the-line Ford F-150 Supercab 4x4. If a male Métis drops out of school, he lowers his lifetime earnings by $428,554, compared to getting his high school diploma. Note that dropping out is the equivalent of owning eight of these trucks and, one-by-one, pushing them off a cliff. If a female Métis drops out as opposed to finishing high school and then going on to university, it lowers her lifetime earnings by $1,256,369. That amount is the equivalent of owning twenty-four of these trucks and one-by-one pushing them off a cliff.[2]

… dropping out is the equivalent of owning eight of these trucks and, one-by-one, pushing them off a cliff.

Another way to understand just how truly large these numbers are is to consider a Métis couple. If they get pregnant and this causes them to drop out of high school and not seek further education, then the couple will have combined lifetime earnings of only $806,775. If, however, they both stay in school and get a high school diploma—even if they don't do technical school or university—their combined earnings nearly double, to $1,584,834. If they both get a high school diploma and then go onto university, their combined lifetime earnings almost double again, to $3,182,505.

The results in this paper present the differences in earnings rates between Aboriginal and non-Aboriginal people and between males and females in Saskatchewan. However, no attempt has been made here to decompose these differences into amounts attributable to different sources or to trace them to their economic, social, historical, or cultural roots. Rather, the purpose is to measure how market outcomes differ to better inform individuals making educational decisions, their families, and politicians making decisions on educational funding and priorities. The purpose of the paper is to measure differences, not explain them.

The next two sections of this report will discuss how the above numbers are computed. Readers who want to stop reading here can be assured of the accuracy of the above results. Readers who want to go on will be in for what amounts to a numerical tour of typical working lives.

1) *I am indebted for this point to Alan Blakney, the late former premier of Saskatchewan, who observed that it would be unfortunate if we waited until grade twelve to convince people of the importance of education. By that time it may be too late. It is important to measure the importance of education rigorously, as has been done here, but then also important to explain the results in ways that are compelling to youth.*

2) *The author has searched diligently for an appropriate numeraire for education other than pickup trucks. However, he recalls a bright 8-year-old girl, a member of the Lac La Ronge Indian Band. What she really wanted in life, she explained, was a Hummer and a driver's license. That made the point that children learn the importance of transportation early in their lives. So perhaps pickup trucks are best.*

General Considerations for the Earnings Numbers

In order to compute lifetime earnings, it is necessary to chart an individual's typical life journey through the labour market and how that journey varies with sex, Aboriginal identity, and education. For this study, that journey is initiated at age 15 in 2011 and continues until retirement, following the usual pattern of retirement. If retirement has not occurred previously, the individual is retired on their 70th birthday. So the journey lasts, at its longest, from 2011 through 2065.

The analysis covers 24 separate groups of people defined by: two sexes; three types of Aboriginal identity (non-Aboriginal, Métis, or North American Indian); and four levels of educational attainment (drops out of school, obtains a high school diploma, completes a program at a non-university post-secondary institution, or obtains a bachelor's degree or higher). For each of the 24 groups, computations proceed by estimating—year-by-year for 2011 through 2065—the probability of survival to that age as well as the values of three fundamental labour market variables: the median wage rate that would be obtained if employed, the labour force participation rate, and the unemployment rate. Expected annual earnings equal the survival probability multiplied by the wage rate if employed multiplied by the participation rate multiplied by one minus the unemployment rate. The results reported above are the discounted present values of those annual earnings.

Discounted present values are computed because a dollar today is worth more than a dollar in the future—because interest can be earned on the dollar today making it grow. For example, a million dollar lottery win which pays of $50,000 per year for twenty years, doesn't have a present value of a million dollars and is not even equal to the annual amount which would likely be earned with a million dollars. If the interest rate is r, the discounted present value of a stream of earnings E_t for t starting at 0 (the current year) through year n (the last) is the following.

$$PV = \sum_{t=0}^{n} \frac{E_t}{(1 + r)^t}$$

For this study, the stream of earnings was in constant dollars, so the interest rate to be used is the real interest rate (defined as the nominal rate minus the rate of inflation). Since 1981, in Saskatchewan, the real interest rate has averaged 3.9%. That rate was rounded down to 3.0% for these calculations because it was felt that future interest rates will be somewhat lower than the three-decade average of the past. More about present values can be found in any intermediate microeconomic theory text. An excellent one is Varian (2006).

The probability of survival is obtained from Statistics Canada's study of mortality in Canada (Statistics Canada, 2006). Our hypothetical individuals begin by being alive at age 15, so the survival probability begins at 1. Starting from a value of 1, the survival probability slowly declines with age. The rate of decrease accelerates at older ages. Females have higher survival probabilities than males at each age. By the time they reach 69, the survival probability of a female is 87% so only about 1 in 10 of females dies prior to the end of our study. The survival probability at that point is 79% for males, so roughly 2 in 10 of males die prior to the end of the study. (Again, both of these odds of dying are contingent on them having lived to age 15, so the survival probabilities from birth would be somewhat lower.)

Let's consider the principal considerations for each of the three fundamental labour market variables in turn, starting with the participation rate. We will consider each of the three variables first, before turning to discussion of the impact of education and Aboriginal Identity on the variables.

For the labour force participation rate, the most significant considerations were the following.

- The labour force participation rate varies during child-bearing years. Some females drop out of the labour force, either temporarily or permanently, to bear and raise children. Not all females do this. Although it is less common, some males are also absent from the labour market during this time.

- Labour force participation varies dynamically over the life cycle, by sex. Labour force participation rises for young adults. For males it rises quickly and plateaus, reaching a maximum of about 95% in the early thirties, and then begins a long, slow decline with aging. Female participation rates rise more slowly, are somewhat lower, and peak later (at about 89% in the early 40's).

- Retirement lowers the value of the labour force participation rate, causing it to gradually fall toward zero with age. For both sexes, however, retirement can be a complicated affair. Even after formal retirement, people (particularly females) may return to the labour force, sometimes taking part-time rather than full-time jobs.

For the unemployment rate, the most significant considerations were the following.

- The unemployment rate is usually a little lower for females—about a half of a percentage point lower over a working life.

- For both sexes, the unemployment rate is notably high in youth, but gradually decreases with age—and hence greater work experience. The rate is at a minimum in the late forties or early fifties. Then it begins to increase: when an older worker loses a job it may take a significant amount of time to find another. Starting in the sixties, however, the unemployment rate again begins to decrease because workers who are unemployed at that age are likely to retire (and hence drop out of the labour force and no longer be counted as unemployed).

For the wage rate, the most significant considerations were the following.

- Wage rates increase over a lifetime as individuals get more experience, and then begin to decrease, as higher paid workers retire or leave the labour market.

- As is well known, the wage rate for females tends to be lower than that for males. Summed over an entire working life, females in Saskatchewan make about 30% less than males.

- Females are at their least relative disadvantage in their teens. The relative disadvantage of females rises to a peak in their early forties when, as discussed above, the female labour force participation rate is rising toward its peak. This is when children are likely moving toward maturity, freeing people who have been involved in childcare to return to the labour market. It is also when many unsuccessful marriages will have dissolved, which may necessitate a return to the labour market for financial reasons.

- The relative disadvantage of females peaks again in their late sixties. This is a point in life when males—having earned more during their lives—are more likely to have the financial where-with-all to allow them to retire rather than take low paying unskilled jobs. Females, on the other hand, are less likely to have that option.

Now consider the effects of education. Not surprisingly, further education lowers unemployment rates and increases participation rates. Examining our four levels of educational attainment, we arrive at the following.

- First, for school dropouts. Male wage rates are 21% lower than the male average; female are 32% lower than the female average. Because of these lower wage rates, dropouts have to work hard to make a living, but fewer jobs are available. A male dropout has an unemployment rate that is 35% higher and a participation rate that is 15% lower than average. A female dropout faces an unemployment rate that is 24% higher and has a participation rate that is 24% lower than average.

- Things improve with a high school diploma, even if there is no further education beyond high school. Wage rates go up, though they are still less than average. Wage rates are 10% lower than average for males and 12% lower than average for females. Because of these lower wage rates, high school graduates have to work hard for a living but—unlike dropouts—jobs are somewhat more readily available. For males, the unemployment rate is still higher than average, but only by 3% and the participation rate is higher by 6%. For females, the unemployment rate is actually worse with a high school diploma, 32% higher, though the participation rate is 1% higher than average. This higher unemployment rate for females occurs because jobs are so very unavailable for female dropouts that they are less likely to seek them unless they know that a particular job is available—which ironically lowers their measured unemployment rate.

- For people who complete a program at a technical school, things get to be even better. Wage rates are 11% higher than average for males and 3% higher than average for females. For males, the unemployment rate is 14% lower than average and the participation rate is 5% higher than average. For females, the unemployment rate is 14% lower than average and the participation rate is 6% higher than average.

Table 7. Annual rates of improvement in labour market outcomes for Aboriginal people in Saskatchewan

	MALE	FEMALE
	Labour Force Participation Rate	
Métis	0.05%	1.31%
North American Indian	0.47%	1.38%
	Labour Force Unemployment Wage	
Métis	-4.67%	-2.24%
North American Indian	-4.67%	-2.24%
	Wage Rate	
Métis	2.26%	0.77%
North American Indian	2.28%	2.44%

- For those who receive a bachelor's degree or higher, wage rates are higher still and the unemployment rate is lower. For males, university graduates earn 55% more than the male average whereas females earn 73% more than the female average. For males, the unemployment rate is 36% lower than average and the participation rate is 3% higher than average. For females, the unemployment rate is 26% lower than average and the participation rate is 13% higher.

Now, consider the effects of Aboriginal identity. In general, people who are North American Indians have a higher unemployment rate, and lower participation rate, though the situation is improving over time. This is similar for Métis.

That the situation is improving can be seen clearly by comparing the results of the 1996 Census with that of the 2006 Census, shown in Table 7. For example, employed North American Indian males earned on average only 35% as much as employed non-Aboriginal males in 1996. By 2006, however, they received 44% as much for an average annual relative improvement (compounded) of 2.28% per year. Extrapolating into the future, the rates of improvement shown in Table 7 were held constant until parity was achieved with non-Aboriginal people.

The fastest rate of increase tended to be for groups with the greatest income disparity, and the slowest tended to be for groups which were closest to parity.

The rates of increase shown in Table 7 are from a comparison of the 1996 and 2006 Censuses. There are three exceptions, all for North American Indians. Between 1996 and 2006 the participation rate for North American Indian males decreased slightly—from 53.8% to 51.6%—although the overall participation rate for all North American Indians improved. It was felt that the overall improvement was more likely for the future, so that was the rate used. The other two exceptions are for the unemployment rate. Although the unemployment rates for male and for female North American Indians decreased notably from 1996 to 2006 (it decreased from 35.1% to 26.5% for males and from 26.3% to 18.9% for females), the unemployment rates for non-Aboriginal people decreased by proportionately even more (from 6.2% to 4.6% for males and from 6.3% to 3.9% for females). Consequently, the ratio of North American Indian to non-Aboriginal unemployment rates increased. The significant decrease in non-Aboriginal unemployment rates was thought to be a one-time occurrence, so further relative improvement in the unemployment rates for North American Indians was expected in the future. Consequently, as can be seen from the entries in Table 7, the rate of improvement for North American Indian unemployment rates was set to equal that for Métis.

The Computations

One important source of data for this analysis was the 2006 Census Public Use Microdata Files. These files show the responses to the long form of the Census, for a sample of respondents after removing or masking any information which would permit the identification of an individual. The sample is of 2.7% of all the individuals living in Saskatchewan. Since the long form goes to 5% of all residents, the sample is slightly more than half of the residents receiving the long form.

Aboriginal (and non-Aboriginal) populations were measured using Aboriginal identity. The Microdata files include a variable for Aboriginal Identity, with six possible codes indicating:

1. North American Indian single response;
2. Métis single response;
3. Inuit single response;
4. Multiple Aboriginal identity responses;
5. Aboriginal responses not included elsewhere; and
6. Non-Aboriginal.

Code 5 includes individuals who identified themselves as Registered Indians or band members on other questions without identifying themselves as Aboriginal on the Aboriginal Identity question. Code 4 was not useful for us since no data indicates specific multiple responses. Code 3 is, of course, irrelevant for Saskatchewan. Consequently, we focused on Individuals who gave a single response—codes 1, 2, or 6. The codes we did not use—3, 4, and 5—are numerically small for Saskatchewan, as shown in the following table.

Table 8. Saskatchewan sample ages fifteen to sixty-nine by Aboriginal identity

1. North American Indian single response	1500
2. Métis single response	890
3. Inuit single response	0
4. Multiple Aboriginal identity responses	8
5. Aboriginal responses not included elsewhere	21
6. non-Aboriginal	15515
Total	17934

Educational attainment was measured using the variable HDGREE from the 2006 Census Microdata Files. The variable codes education attainment with 15 possible values, as given in Table 9.

Table 9. Saskatchewan sample ages fifteen to sixty-nine by educational attainment

1. None	4730
2. High school graduation certificate or equivalency	5013
3. Other trades certificate or diploma	1341
4. Registered apprenticeship certificate	794
5. College, CEGEP or other non-university certificate or diploma from a program of 3 months to less than 1 year	557
6. College, CEGEP or other non-university certificate or diploma from a program of 1 year to 2 years	1615
7. College, CEGEP or other non-university certificate or diploma from a program of more than 2 years	583
8. University certificate or diploma below bachelor level	748
9. Bachelor's degree	1822
10. University certificate or diploma above bachelor level	138
11. Degree in medicine, dentistry, veterinary medicine or optometry	47
12. Master's degree	368
13. Earned doctorate degree	67
88. Not available	111
89. Not applicable	0
Total	17934

These codes were combined into four levels of educational attainment, as follows:

- No high school diploma, code 1;
- High school diploma, code 2;
- Technical school diploma, codes 3 through 8; and
- Bachelor's degree or higher, codes 9 through 13.

The population of Saskatchewan aged 15 to 69 is approximately half male and half female. However, females make up slightly more than half due to their longer life expectancy, and males slightly less, as shown in Table 10.

Table 10. Saskatchewan sample ages fifteen to sixty-nine by sex

1. Male	8863
2. Female	9071
Total	17934

Table 11 shows sample numbers combining education, sex, and Aboriginal identity. Note that, typically, males are more likely than females to be dropouts and that post-secondary diplomas (technical school or university) are more likely to be held by females than males. It was shown in this study that these male/female differences correspond to the financial incentives faced by each sex in pursuing education: females have a larger financial incentive to seek an education. However, the differences between the non-Aboriginal and Aboriginal peoples, shown in the rows, have not yet aligned with the financial incentives. Aboriginal peoples have a greater financial incentive to seek post-secondary education, but their rate of attaining post-secondary degrees continues to be lower.

Table 11. Saskatchewan sample by sex, education, and Aboriginal identity

Educational Attainment	Male	Female	Total
	non-Aboriginal		
No high school diploma	1956	1561	3517
High school diploma	2259	2232	4491
Technical school diploma	2357	2728	5085
Bachelor's degree or higher	1071	1251	2322
Total	7643	7772	15415
	Métis		
No high school diploma	194	168	362
No high school diploma	102	120	222
Technical school diploma	126	123	249
Bachelor's degree or higher	19	34	53
Total	441	445	886
	North American Indian		
No high school diploma	415	419	834
High school diploma	133	162	295
Technical school diploma	142	158	300
Bachelor's degree or higher	18	47	65
Total	708	786	1494
TOTAL	8792	9003	17795

Aboriginal peoples have a greater financial incentive to seek post-secondary education, but their rate of attaining post-secondary degrees continues to be lower.

In order to estimate the lifetime earnings of individuals, it was necessary to measure the way in which wage rates, labour force participation rates, and unemployment rates vary with age, sex, and education. Note from Table 11 that the number of non-Aboriginal people in the sample dramatically exceeded the number of Aboriginal people: there were not enough Aboriginal observations in order to do this independently for Aboriginal people. Our research strategy was to compute these wage-distributions by age from the non-Aboriginal data and make multiplicative adjustments to them for the corresponding labour-market outcomes for Aboriginal peoples.

How does the labour force participation rate vary with age? It follows a different pattern for males and females, and for people with different levels of education, as shown in Table 12. Table 12 has overly much data—over 200 separate numbers—but it can be understood when it is examined with care. It shows the labour-force participation rate as well as the unemployment rate in the week prior to the Census.

First examine the rows labelled 15-69, which show the results for an entire career. School dropouts typically have the lowest participation rate and the highest unemployment rate. So, for example, a male who drops out from school and doesn't subsequently earn high school equivalency, had a participation rate of 71.9% over his career, as opposed to a high school graduate with 88.9% a technical school graduate with 88.3% or a university graduate with 86.9%. Similarly for females.

Table 12. Saskatchewan non-Aboriginal labour-force participation and unemployment rates by age, sex, and educational attainment

	Participation Rate		Unemployment Rate	
AGE	MALE	FEMALE	MALE	FEMALE
	No high school diploma			
15-19	52.7%	51.4%	12.1%	6.8%
20-24	87.3%	64.5%	12.5%	8.2%
25-29	92.7%	65.6%	7.9%	9.5%
30-34	89.0%	65.1%	6.2%	3.6%
35-39	87.2%	75.4%	4.0%	8.2%
40-44	91.1%	79.2%	6.3%	2.6%
45-49	91.3%	73.1%	0.0%	3.1%
50-54	90.0%	73.6%	2.0%	2.2%
55-59	86.0%	65.5%	3.4%	2.2%
60-64	63.9%	56.5%	5.9%	5.4%
65-69	42.8%	20.6%	2.6%	0.0%
15-69	71.9%	57.7%	6.3%	4.9%

Table 12 - continued next page

Table 12** (continued) **Saskatchewan non-Aboriginal labour-force participation and unemployment rates by age, sex, and educational attainment

	Participation Rate		Unemployment Rate	
AGE	MALE	FEMALE	MALE	FEMALE
High school diploma				
15-19	84.5%	79.2%	8.0%	11.6%
20-24	88.7%	82.7%	8.8%	8.5%
25-29	95.2%	78.4%	6.5%	13.3%
30-34	94.0%	78.7%	2.8%	4.5%
35-39	95.5%	78.2%	3.2%	3.6%
40-44	93.6%	87.6%	2.1%	2.7%
45-49	95.0%	88.1%	2.3%	1.2%
50-54	93.8%	81.5%	3.5%	0.9%
55-59	88.2%	72.9%	4.9%	3.4%
60-64	65.7%	47.1%	3.1%	4.6%
65-69	45.6%	22.4%	2.4%	9.1%
15-69	88.9%	76.9%	4.8%	5.2%
Technical school diploma				
15-19	88.2%	92.6%	20.0%	20.0%
20-24	93.4%	83.1%	9.6%	5.1%
25-29	93.7%	87.5%	4.8%	3.1%
30-34	96.1%	86.5%	2.7%	3.9%
35-39	94.7%	86.3%	2.2%	3.4%
40-44	94.5%	90.7%	2.2%	2.4%
45-49	93.4%	91.4%	2.9%	1.2%
50-54	93.9%	85.6%	5.1%	1.6%
55-59	85.2%	78.0%	4.6%	3.3%
60-64	71.9%	50.0%	4.1%	3.8%
65-69	34.9%	23.9%	2.2%	3.0%
15-69	88.3%	80.6%	4.0%	3.0%
Bachelor's degree or higher				
15-19	*	*	*	*
20-24	80.6%	89.8%	14.0%	10.2%
25-29	86.3%	88.2%	6.9%	3.4%
30-34	96.6%	86.0%	4.3%	4.1%
35-39	98.2%	90.2%	0.9%	2.9%
40-44	94.6%	94.8%	1.6%	0.0%
45-49	94.6%	92.8%	0.0%	1.7%
50-54	93.5%	88.7%	3.1%	0.0%
55-59	81.6%	76.3%	2.0%	3.3%
60-64	73.7%	53.0%	0.0%	2.9%
65-69	41.7%	47.4%	0.0%	0.0%
15-69	86.9%	85.4%	3.0%	2.9%

*Note that the sample doesn't contain anyone aged 15-19 in the top education group, so the elements of those rows are marked with an **

Males who graduate from high school tend to work longer compared to ones who go on to technical school or university. As a consequence, their participation rate is somewhat higher. They also have a higher unemployment rate. There is relatively little difference between the results for people who have a high school diploma as opposed to those who complete technical school, though university makes a greater difference.

Females have lower lifetime participation rates than males, though the difference between the sexes for those with university is marginal.

In young adulthood, participation rates increase fairly quickly, plateau, and then begin to gradually decrease with age. The exception is for females who have somewhat lower participation rates during their childbearing years, because females are more likely to look after children than males.

Unemployment rates are dramatically higher for young people. It is interesting that in the 20-24 age cohort, the unemployment rate is highest for both males and females for those who have university. This is because the others have gotten more employment experience compared to those who are studying at university. Moreover, those with university are more likely to be seeking a career rather than only a job. Finding a career tends to take longer, so the unemployment rate is higher.

Wage rates also vary over a lifetime, depending on education and sex. The following table shows the median annual wage rate for Saskatchewan for those reporting wage income for the year prior to the 2006 Census, so for 2005.

Table 13. Saskatchewan non-Aboriginal wage rates by age, sex, and educational attainment

AGE	MALE	FEMALE
No high school diploma		
15-19	$3,000	$4,000
20-24	$18,000	$11,000
25-29	$27,000	$21,000
30-34	$34,000	$24,000
35-39	$32,000	$28,000
40-44	$39,000	$29,000
45-49	$37,000	$30,000
50-54	$31,500	$31,000
55-59	$35,000	$25,000
60-64	$20,000	$19,000
65-69	$12,500	$8,000
15-69	$26,273	$20,909

AGE	MALE	FEMALE
High school diploma		
15-19	$8,000	$3,000
20-24	$16,000	$10,000
25-29	$27,000	$11,000
30-34	$38,000	$13,000
35-39	$38,000	$12,000
40-44	$40,500	$18,000
45-49	$44,000	$23,000
50-54	$44,500	$19,000
55-59	$41,000	$17,500
60-64	$16,000	$16,000
65-69	$11,000	$8,000
15-69	$29,455	$13,682

Table 13 - continued next page

Table 13 (continued) ***Saskatchewan non-Aboriginal wage rates by age, sex, and educational attainment***

AGE	MALE	FEMALE
Technical school diploma		
15-19	$9,500	$5,500
20-24	$21,500	$10,000
25-29	$36,500	$14,000
30-34	$43,000	$16,000
35-39	$49,500	$22,000
40-44	$50,000	$24,000
45-49	$49,000	$27,000
50-54	$52,000	$25,000
55-59	$40,000	$22,000
60-64	$32,000	$15,500
65-69	$12,000	$10,000
15-69	$35,909	$17,364

AGE	MALE	FEMALE
Bachelor's degree or higher		
15-19	*	*
20-24	$12,500	$12,000
25-29	$29,000	$33,000
30-34	$42,500	$36,500
35-39	$62,000	$41,000
40-44	$64,500	$49,500
45-49	$71,000	$59,500
50-54	$72,000	$61,000
55-59	$63,500	$38,500
60-64	$60,000	$38,000
65-69	$35,000	$7,000
15-69	$51,200	$37,600

Also, mortality rates vary over a lifetime. Statistics Canada recently completed a study of life expectancy in Canada (Statistics Canada, 2006). Table 14 shows the life expectancy of a Canadian female and male who have lived to be 15.

The lifetime earnings results reported in this paper were the results of the passage of typical individuals through the labour market over the period 2011 through 2065. There were separate spreadsheets giving detailed earnings per year for each of our twenty-four groups. As noted above, for each year, annual expected earnings were arrived at as the product of earnings if employed times the participation rate times one minus the unemployment rate times the survival rate. An example of such a spreadsheet computation is given in Howe (2004).

Table 14. Saskatchewan survival rates by sex, for someone who lives through the end of the fourteenth year

AGE	MALE	FEMALE
	Probability of being alive at the end of the period	
15-19	99.7%	99.9%
20-24	99.3%	99.7%
25-29	98.9%	99.5%
30-34	98.4%	99.3%
35-39	97.8%	99.0%
40-44	97.0%	98.4%
45-49	95.7%	97.6%
50-54	93.7%	96.3%
55-59	90.5%	94.2%
60-64	85.4%	91.1%
65-69	77.7%	86.2%

How These Findings Relate to Other Studies

There is a substantial literature on the financial return to education. A useful summary can be found in Ashenfelter and Rouse (2000), an analysis which reveals both the strengths and the weaknesses of that literature. Figure 1, from Ashenfelter and Rouse, shows the financial rate of return to post-secondary education by sex and ethnicity.

Note from Figure 1 that females have a higher rate of return than males—just as was arrived at (independently) in the computations in this analysis. Females, as is well known, make less than males in Canada. However, females with higher levels of education make similar amounts. Consequently, although both males and females experience positive returns—the more you learn the more you earn—females also benefit from catching up to males. Consequently, females receive a double benefit from education. Their earnings rise because average earnings rise with education, but they also rise because they are catching up with males.

Aboriginal people earn less than non-Aboriginal people, on average. But the difference largely disappears for higher levels of education. Consequently, Aboriginal people receive a double benefit from education.

Similarly for Aboriginal people, note in Figure 1 that Aboriginal people have among the highest rates of return to education.[3] Why? Just as in the analysis of females, Aboriginal people earn less than non-Aboriginal people, on average. But the difference largely disappears for higher levels of education. Consequently, Aboriginal people receive a double benefit from education.

In fact, the rate of return for Aboriginal females is truly extraordinary because they receive a triple benefit from education. Their earnings rise because average earnings rise with education, and also rise because they are catching up with males, and also rise because they are catching up with non-Aboriginal earnings.

Although the literature summarized by Figure 1 is useful and interesting, it has significant shortcomings. Foremost, the rates of return in Figure 1 are for post-secondary education alone. Figure 1 says nothing about the financial value of a high school diploma. However, a fundamental educational decision for many Aboriginal people in Canada is whether to persist and receive a high school diploma.

Moreover, the results in Figure 1 say nothing about the return to different types of post-secondary education. For example, the results in Figure 1 say nothing about the return to attending a post-secondary technical school as opposed to a university. Figure 1 combines all forms of post-secondary education, whether law school, university, or learning to be a heavy equipment operator.

Like most of the analyses in the literature, the results shown in Figure 1 are derived using data from the United States. It is not a priori obvious whether it applies to Canada or Saskatchewan.

Finally, the results shown in Figure 1 are not compelling for most young people. You would certainly get my attention if I were shown that I could make a fifteen percent return on an investment. However, the same thing is not true of many young people, characterized by inexperience and with the impatience of youth.

For these reasons, the current study was conducted to include high school completion, as well as completion of technical school and university as separate categories. Moreover, the financial benefits were expressed in terms of dollars of earnings (and even pickup trucks), not in terms of a percentage rate of return.

3) *In particular, the highest rate of return is for Aboriginal females. Among men, Aboriginal males are in a tie for second place.*

In addition to the literature discussed by Ashenfelter and Rouse, there are also well-reported academic analyses that question the financial importance of education. Most laypeople aren't aware of an inherent conflict of interest. Academics get tenure and career advancement based largely on their publications. But you cannot typically successfully publish things which are already well known. The positive financial significance of education is well known. Consequently, some researchers will mine data sources and econometric techniques for ways to arrive at a negative conclusion, and then successfully publish the negative.[4] This conflict of interest is well-understood by academic economists, who take it into account in interpreting the literature. Non-academics—especially in the media—are frequently, however, credulous readers of such articles. To clear the air, Harmon et al.(2003) is a good review of the literature.

… the difference in the level of educational attainment in Canada is one of the forces which is exacerbating economic inequality in our country

In the current study, the financial return to education was measured in terms of the completion of programs, whether they are high school, technical school, or university. That is because there is strong evidence for the so-called sheep-skin effect. There is value to a credential beyond the knowledge necessary to receive it (Ferrer and Riddell, 2002).

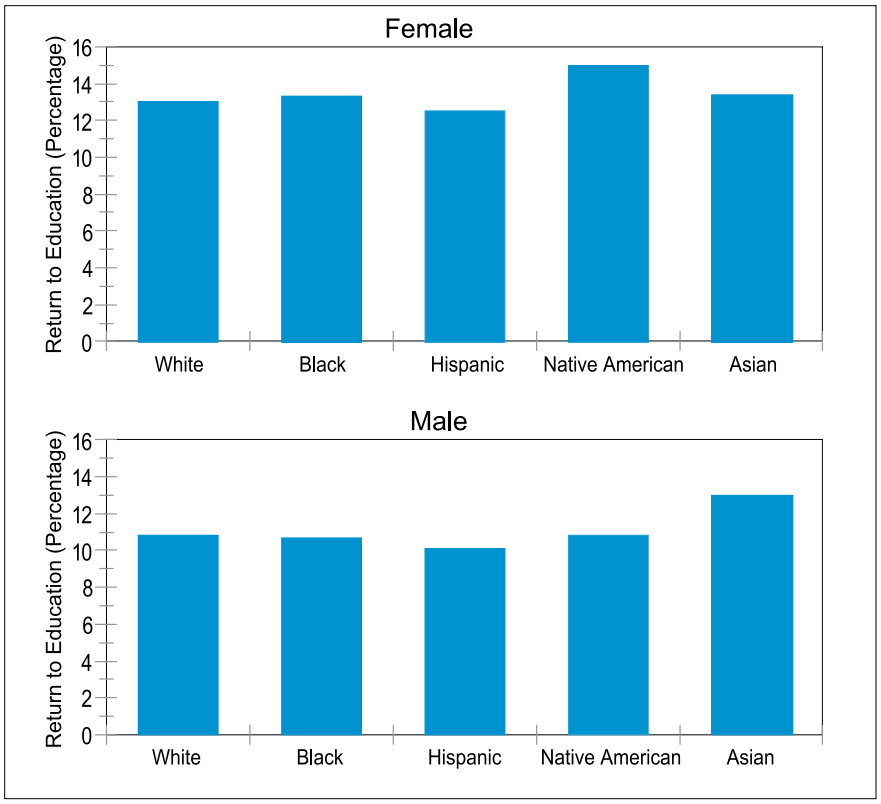


Figure 1. The Return to Education by Sex and Race/Ethnicity for the United States

The importance of analyses like the current one—which seek to measure and then publicize the financial importance of education—cannot be understated. There is a tendency for people to underestimate the positive financial value of education, as discussed in Jensen (2010). Of course, the large positive financial return to an education cannot impact individual decision making unless its magnitude is perceived.

The analysis by Lu et al. (2011) shows that the difference in the level of educational attainment in Canada is one of the forces which is exacerbating economic inequality in our country. That observation emphasizes the importance of education and has important social policy implications for Canada. From the perspective of the individual, however, it emphasizes the importance of using education as a source of economic prosperity, and

4) *In these litigious times, I should emphasize that this observation is not universal.*

the results of this study should be interpreted in that context. A young Métis couple who is contemplating dropping out of school should be aware that their lifetime family earnings would be expected to be $806,775. Another Métis couple—friends, let's say—who complete high school and go on to a program at a technical school would expect to have lifetime family earnings of $2,032,098. That is exactly the sort of inequality referred to in analysis by Lu. However, as individuals make educational choices, they should be aware of the financial implications of those choices, and ask whether they prefer to live their lives with earnings of over $2 million or less than half.

The computations reported in the current analysis use techniques from the rapidly growing field of forensic economics. Reviews of some of the important techniques can be found in Schap (2010) and Tinari (2010).

One of the results from the forensic economics literature that is particularly relevant is that the wage distributions that are the basis for the results shown in this analysis have an important bias. They understate the future earnings of females (Cushing and Rosenbaum, 2010) because the future will result in increasing porousness for the glass ceiling faced by educated females. Thus the amounts shown for females should be regarded as lower estimates, both for lifetime earnings as well as for the return to education. Moreover, similar results in a negative direction should be true for high school dropouts, since their economic lives in the information age can be expected to become increasingly precarious. Thus the lifetime earnings of high school dropouts have been overestimated.

Undiscounted Earnings

The results presented in this study are stated in terms of discounted lifetime earnings. In many contexts, however, earnings are summed without discounting. Although discounting is logically appropriate when considering decisions that have an intertemporal dimension, many consumers do not think that way and prefer not to discount future earnings. So they would be interested in the earnings results of this paper stated as undiscounted lifetime earnings. The results in Table 1 through 6 can be approximately converted to undiscounted earnings by multiplying the non-Aboriginal earnings by 2.15, Métis earnings by 2.18, and North American Indian earnings by 2.33.

The reason that the multiple is higher for Aboriginal people than for non-Aboriginal people is that Aboriginal earnings are somewhat further in the future—as Aboriginal labour markets improve over time—and hence Aboriginal earnings are subject to greater discounting.

So Table 2, near the beginning of this report, shows that a female Métis who is fifteen in 2011, who goes on to get a bachelor's degree can expect earnings with a discounted present value of $1.5 million, but those earnings sum to $3.2 million undiscounted. A North American Indian male who drops out of school, in Table 4, is reducing his lifetime earnings by a present value of $0.4 million, but those foregone earnings sum to $1.0 million undiscounted.

References for Part I

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Part II: Bridging the Aboriginal Education Gap in Saskatchewan

Bridging the Aboriginal Education Gap Yields $16.2 Billion in Individual Monetary Benefits

There is significant uncertainty about the aggregate size of Saskatchewan's populations of Aboriginal people. In response to the Aboriginal identity question on the Census of 2006, 141,890 individuals in Saskatchewan indicated an Aboriginal identity—of whom 91,400 gave the single response of North American Indian and 48,120, Métis. There is, however, a consensus that the Census of Canada undercounts the Aboriginal population (Guimond, Kerr, & Beaujot, 2003). There are a number of sources of the undercounting—such as incompletely enumerated Reserves. For the 2006 Census, however, there were no incompletely enumerated reserves in Saskatchewan. The most significant source of undercounting for Saskatchewan results from the difficulty of counting a population of individuals many of whom are economically marginalized and subject to "churn." Churn means that individuals move frequently.

There is…a consensus that the Census of Canada undercounts the Aboriginal population.

Examining other data sources, it seems that the amount of undercounting is large. For example, the Census of 2006 indicates that there were 90,720 Saskatchewan Registered Indians, whereas the Indian Register indicates that the number was actually 123,017, for a difference of 35.6%.

In an earlier analysis (Lendsay, Painter, & Howe, 1997), this writer used the percentage undercounting of the Registered Indian population to adjust the size of the entire Aboriginal population of Saskatchewan, which would yield a 2006 Aboriginal population of 192,403. The current study, however, uses the unadjusted Census data—hence applying a 0% adjustment. The truth likely lies between 0% and 35.6%. For this study, a 0% adjustment was used so that the reader can rest assured that an upward adjustment was not the cause of the following substantial dollar amounts.

A consequence of the 0% adjustment is that the following dollar amounts are underestimates since they are based on underestimated Aboriginal population data. However, the computations are performed—and the results presented—in such a way that anyone wanting to make an x% upward adjustment in the size of the Aboriginal population, would increase the following aggregate dollar amounts multiplicatively by x%.

The principal data source for this study is the Public Use Microdata File from the 2006 Census, which consists of a sample of the individual responses to the Census long form after the removal of any identifying information.

Table 1. Saskatchewan sample ages fifteen to sixty-nine by Aboriginal identity

1. North American Indian single response	1,500
2. Métis single response	890
3. Inuit single response	0
4. Multiple Aboriginal identity responses	8
5. Aboriginal responses not included elsewhere	21
6. Non-Aboriginal	15,515
Total	17,934

The Microdata File for Saskatchewan includes 25,894 individuals, of whom 2,581 selected the North American Indian single response to the Aboriginal Identity question, 1,286 selected the Métis single response, and 21,982 selected the non-Aboriginal single response. We are interested in the labour market outcomes, so we focus on the population of labour force age—age 15 or older—which is when Statistics Canada begins to keep track of labour market outcomes. Following the approach taken in Part I of this study (Howe, 2011), we will not include individuals after their 70th birthday. Table 1 gives the number of Saskatchewan residents aged 15 to 69 in the Public Use Microdata File from the 2006 Census, by their response to the Aboriginal Identity question.

This analysis will focus on the single-responses 1, 2, and 6. Response 3 is irrelevant for Saskatchewan. Response 4 is tiny, but could conceptually be included except that no information is provided as to the nature of the multiple responses. Response 5 is small, and consists of individuals who gave responses to other questions which seem to imply an Aboriginal identity, but not in the Aboriginal identity question. It is excluded from this study as well, since populations are being measured by the self-declared identity of the individual.

Table 2 shows the educational attainment by sex and Aboriginal Identity for those who are aged 15 to 69 in Saskatchewan, based on the Microdata File for the 2006 Census. Several observations stand out. Note that the proportion of non-Aboriginal residents who don't have a high school diploma is 25.6%, probably higher than most expect. There are two reasons for its size. One is that the age range includes individuals as young as 15, some of whom are still in school. The other reason is that the age range includes individuals as old as 69, from an era when high school completion rates were lower. For example, for non-Aboriginal people, 39.2% of males and 38.2% of females in the age 65-69 cohort do not have a high school diploma, whereas the same is true for only 14.9% of males and 9.5% of females in the age 25-29 cohort.

The Aboriginal education gap—between the average educational attainment of Aboriginal and non-Aboriginal people—stands out in Table 2.

Table 2. Educational attainment by sex and Aboriginal identity

Educational Attainment	Male	Female
	non-Aboriginal	
No high school diploma	25.6%	20.1%
High school diploma	29.6%	28.7%
Technical school diploma	30.8%	35.1%
Bachelor's degree or higher	14.0%	16.1%
	Métis	
No high school diploma	44.0%	37.8%
No high school diploma	23.1%	27.0%
Technical school diploma	28.6%	27.6%
Bachelor's degree or higher	4.3%	7.6%
	North American Indian	
No high school diploma	58.6%	53.3%
High school diploma	18.8%	20.6%
Technical school diploma	20.1%	20.1%
Bachelor's degree or higher	2.5%	6.0%

How large is the Aboriginal education gap? How many additional high school graduates, technical school graduates, and university graduates would be required in Saskatchewan to raise the rates of educational attainment for Métis and for North American Indians to equal that of non-Aboriginal people? That is given in Table 3, where the results have been scaled up to equal that of the entire province using the variable WEIGHT in the Microdata file.

Table 3 shows that many more Aboriginal graduates are required in order to bridge the Aboriginal education gap. For example, the total number of additional credentials required for Métis sums to 5,017 consisting of a somewhat more males than females; the total for North American Indians is 16,878 consisting of somewhat more females than males.

Table 3. Number of additional graduates required to bridge the Aboriginal education gap

Educational Attainment	Male	Female	Total
	Métis		
High school diploma, terminal	1,284	368	1,652
Technical school diploma, terminal	-3	689	686
Bachelor's degree or higher	1,372	1,307	2,679
	North American Indian		
High school diploma, terminal	3,181	2,453	5,634
Technical school diploma, terminal	2,024	3,554	5,578
Bachelor's degree or higher	2,601	3,065	5,666

One qualification of the results in Table 3 should be stated, though it is probably obvious. The high school diploma level of educational attainment shown in Table 3 refers to an individual who completes high school and does not go on to complete technical school or university. Those going on to technical school or university would also obtain high school diplomas along the way. Thus the actual number of additional high school diplomas is large. For example, the additional number of Métis females who need to get high school diplomas is 368 + 689 + 1,307 = 2,364.

The sole negative entry, -3, in Table 3 deserves comment. An entry that small is effectively zero, showing that there is no Aboriginal education gap for the completion of technical school for Métis males. This is a reflection of the quality of programs available at, for example, the Dumont Technical Institute. It is not, however, a reason to rest on our Métis-technical-education laurels. Note that the number of Métis females required to complete technical school more than offsets the number of males. Moreover, Saskatchewan faces a shortage of skilled tradespeople, so the number of people—both Aboriginal and non-Aboriginal—is insufficient for our provincial needs.

How much is Saskatchewan wasting by not educating its Aboriginal population …

Another comment needs to be made about the sole negative entry in Table 3. The negative entry may seem to be inconsistent with the result from Table 2 which shows that a smaller portion of Métis males than non-Aboriginal males have completed technical school, 28.6% as opposed to 30.8%. This difference results from the different ways that Tables 2 and 3 are computed. Table 2 presents results that were computed for the entire population aged 15 to 69, whereas Table 3 presents results that were computed separately for five-year age cohorts (for reasons that will become apparent momentarily) and then summed across cohorts. There are particular age cohorts in which Métis male representation among technical school graduates is particularly weak and non-Aboriginal male representation is particularly strong. The impact on the numbers is straightforward.

By concentrating the negatives in a few periods—resulting in Table 3—the results appear to differ from those shown in Table 2. Computationally, this works just like electoral redistricting, which can be used by a political party to try to concentrate opposition votes in a small number of ridings. In any case, the results shown in Table 3, computed by age cohort, are—as we are about to see—more relevant.

Table 3 shows that society is wasting a valuable resource. Part I of this study demonstrates, for example, that a Métis female in Saskatchewan who graduates from university will on average have lifetime earnings with a discounted present value of $1.5 million—representing $3.2 million undiscounted. Table 3 shows that Saskatchewan needs to have another 1,307 people like that in order to bring the level of university attainment of Métis females up to that of non-Aboriginal females. So, society is wasting a valuable resource. Similarly for both males and females, both Métis and North American Indians, and for all three levels of educational attainment considered here (graduating from high school, technical school, or university).

… society is wasting a valuable resource.

How much does it add up to? How much is Saskatchewan wasting by not educating its Aboriginal population as thoroughly as its non-Aboriginal? The analysis has to take into account the age distribution of the population because the economic cost of having an undereducated young person is greater than the cost of having an undereducated elderly person because the younger person will be spending more years in the labour market.

Table 4 shows the increase in the present value of lifetime earnings by educational attainment by age, sex, and Aboriginal identity. Each entry shows the increase in the present value of lifetime earnings for the given level of educational attainment. Each entry refers to the remainder of the working life for a person of a given age.

The entries in Table 4 can be related to Tables 4, 5, and 6 of Part I of this study. The tables in Part I apply to a person who is age 15 in 2011. The entries in Table 4, below, provide the results of the same computation, but carried on from any age rather than just age 15.

Table 4. Increase in lifetime earnings from education by sex, age, credential, and Aboriginal identity

	Métis		North American Indian	
AGE	MALE	FEMALE	MALE	FEMALE
High school diploma				
15-19	$428,554	$349,505	$434,739	$277,505
20-24	$484,548	$392,615	$498,223	$317,950
25-29	$507,977	$415,351	$547,853	$351,632
30-34	$501,333	$410,492	$572,440	$367,202
35-39	$472,603	$389,186	$569,356	$362,151
40-44	$421,439	$352,402	$531,942	$338,343
45-49	$350,329	$293,641	$455,719	$288,213
50-54	$265,447	$216,150	$350,001	$212,909
55-59	$172,245	$128,905	$233,585	$125,432
60-64	$85,706	$57,820	$118,131	$56,215
65-69	$25,344	$12,567	$35,558	$12,484
Technical school diploma				
15-19	$695,990	$529,333	$637,488	$555,410
20-24	$786,806	$592,274	$731,253	$629,778
25-29	$823,748	$621,941	$805,164	$677,460
30-34	$813,572	$610,443	$838,616	$680,098
35-39	$769,937	$574,543	$831,913	$646,918
40-44	$690,328	$517,469	$776,604	$586,065
45-49	$578,143	$438,464	$667,646	$504,370
50-54	$444,215	$331,638	$517,464	$393,485
55-59	$297,461	$201,971	$353,063	$258,197
60-64	$148,292	$90,795	$184,128	$131,469
65-69	$43,995	$19,630	$55,544	$28,615
Bachelor's degree or higher				
15-19	$1,119,361	$1,256,369	$1,107,733	$1,180,579
20-24	$1,261,511	$1,396,586	$1,257,911	$1,334,947
25-29	$1,309,904	$1,465,859	$1,350,467	$1,431,388
30-34	$1,285,106	$1,439,937	$1,387,323	$1,437,522
35-39	$1,212,770	$1,359,482	$1,371,485	$1,369,481
40-44	$1,085,720	$1,230,824	$1,283,490	$1,243,888
45-49	$905,625	$1,053,928	$1,109,709	$1,075,871
50-54	$693,878	$814,305	$876,351	$847,546
55-59	$455,978	$523,324	$614,094	$568,884
60-64	$225,984	$246,194	$343,082	$308,311
65-69	$66,362	$53,105	$102,997	$67,038

For example, Table 4 shows that a Métis female aged 45-49 who does not have her high school diploma can expect that obtaining high school equivalency will add $293,641 to her earnings during the remainder of her life. If, instead, she gets high school equivalency and then completes technical school her additional earnings equal $438,464; if high school equivalency and then university her additional earnings equal $1,053,928. Of themselves, those dollar amounts reflect the importance of adult education programs.

The reader may be interested to note that the present value of lifetime earnings shown in Table 4 initially increases with age, despite the fact that increased age obviously reduces the number of remaining years in an individual's working life. The increase occurs for all of the groups represented in Table 4, and ends in the late twenties or early thirties depending on the group. The increase is caused by an individual moving closer to their prime earning years. Present value computations heavily discount the more distant future. Early in adulthood, aging moves the prime earning years closer, so the present value of earnings increases.

So how much is Saskatchewan's economy wasting because of the Aboriginal education gap? This section of Part II is confined to analyzing lifetime earnings. So, restating the question: how much does Saskatchewan waste in lifetime earnings as a consequence of its Aboriginal education gap?

At this point, the computation is straightforward. Disaggregate Table 3 by age, so the numbers of additional individuals are obtained by sex, Aboriginal identity, and age. You find, for example, that Saskatchewan needs another 197 Métis males aged 20-24 with a terminal high school diploma. Multiply these into the numbers in Table 4 which give the additional lifetime earnings of those with the credential. For a Métis male, age 20-24, the lifetime earnings are $484,548 higher than for a dropout. So the increase in lifetime earnings of all 197 Métis males aged 20-24 equals

$$197 \times \$484{,}548 = \$95{,}455{,}956$$

From this, we can conclude that bridging the high school component of the Aboriginal education gap for Métis males aged 20-24 would increase the present value of provincial income by about $95 million, measured in 2011 dollars.

The $95 million in the previous paragraph just refers to the foregone earnings of Métis males aged 20-24 who get a terminal high school diploma instead of dropping out. What about summing both sexes, summing Métis and North American Indians, and summing by credential? The result of that summation is shown in Table 5.

Table 5. Increase in lifetime earnings from bridging the Aboriginal education gap in Saskatchewan, by credential

High school diploma, terminal	$2,578,783,287
Technical school diploma, terminal	$3,638,566,565
Bachelor's degree or higher	$9,939,000,558
Total	$16,156,350,410

Thus, bridging the Aboriginal education gap in Saskatchewan would increase the present value of lifetime earnings for our population by $16.2 billion. Before putting that amount of money in context—to try to illustrate how much money is on the line—we have to consider other benefits of education. When individuals get higher levels of education, one of the benefits is that their earnings increase as above. However, there are other benefits, both to the individual and to society. That is the subject of the next two sections of this report.

Add Individual Nonmonetary Benefits and the Yield Increases to $64.8 Billion

The $16.2 billion from bridging the Aboriginal education gap identified in the previous section only takes account of the individual monetary benefits of education. In addition to monetary benefits, the individual also receives nonmonetary benefits. There is a fascinating literature on the nature of the nonmonetary benefits of education. The literature usually refers to them as nonpecuniary benefits, but this writer prefers the word nonmonetary.

Some of these benefits are obvious and result from easily understood mechanisms. For example, many people enjoy both attending educational institutions and the process of learning itself. As a personal note, this writer notes that an important reason for him enrolling in graduate school (very long ago) was that the enjoyment of attending university was about to be cut short by graduation! Graduate school was a way to keep attending university. In the literature, the enjoyment of learning and of attending educational institutions is referred to as the consumption benefit of education.

Some of the nonmonetary benefits flow through the changes that education makes in a working life. In addition to simply earning more, higher levels of education tend to increase job satisfaction. Sometimes this is through the greater likelihood of enjoyable social interaction. Sometimes it is through the job having greater prestige, or offering a greater sense of accomplishment. Further education not only yields greater income, but also changes the way others look at us and how we look at ourselves. Another set of nonmonetary benefits of education that flows through the labour market involves fringe benefits. Individuals with more education tend to earn more money, as was the subject of Part I of this study, but they also are more likely to get longer paid vacations, stock options, better access to healthcare (even in Canada) and dental care, private pension plans, and the other things provided by employers in addition to earnings. The aggregate size of fringe benefits can be quite large and is growing robustly, in part due to preferential tax treatment.

Substantial periods of unemployment have been shown to have a negative psychological affect that exceeds what can be explained by the lowering of income. One effect of education is to lower the rate of unemployment. Ironically, the short run effect of education may be to increase unemployment rates: an individual who is (largely) out of the labour market getting more education may be temporarily disadvantaged compared to an individual who is in the labour market full time accumulating job experience. (Hence the regular media stories about university graduates having trouble finding jobs.) However, the temporary disadvantage recedes, lowering unemployment rates. Part I of this study included the effect on earnings of unemployment rates which are temporarily higher and then lower. Part I did not, however, include the additional negative psychological effect of unemployment.

… higher levels of education result in improved health and greater longevity.

Some of the nonmonetary benefits of education result from what happens outside the labour market. The most often-cited example is that higher levels of education result in improved health and greater longevity. The health effect is partly due to increased income, but only partly. One effect of education is to improve overall decision making so an educated individual is less likely to engage in activities (smoking, for example) that lower health.

The effect of education on decision making and overall critical reasoning skills can enter into all aspects of life and living. For example, education increases the likelihood that an individual will effectively use contraception to plan parenthood. Females are less likely to consume alcohol during pregnancy and the children are the beneficiaries of greater individual attention and spending (in part because their parents earn more). Consequently, the children tend to have better health and developmental outcomes—which adds to the satisfaction of the parent and hence is a nonmonetary benefit of education to the parent.

Another nonmonetary benefit is directly linked to decision making. Although education does not make an individual less impatient, it does make an individual less myopic. The process of education leads to individuals being better at visualizing future gains, so they are more willing to endure short-term pain to bring about long-term gain.

Some benefits of education may seem counterintuitive. It might seem reasonable to suppose that the higher earnings that result from education are also associated with higher responsibility and higher levels of individual stress. However, empirical analysis shows the effect goes in the other direction: individuals with lower levels of education tend to have higher levels of stress—probably because they earn less.

Given the nature and heterogeneity of nonmonetary benefits, quantification is challenging. It is difficult to measure the individual enjoyment of attending university; the enjoyment of having one's own health or the health of one's children; the satisfaction that comes from higher job status; and so forth. Moreover, it is nearly impossible to measure them all and sum them up. Nearly impossible, but not impossible. In a landmark study published in one of economics' leading journals, Oreopoulos and Salvanes (2011) successfully deal with the quantification issue. They use longitudinal survey data from the USA which includes individuals' answers to questions about personal satisfaction, levels of income, and levels of education. Econometrically, their analysis encompasses: the effect on personal satisfaction of income; the effect on personal satisfaction of education; and the effect on income of education. The nonmonetary benefit equals the portion of the increase in satisfaction that occurs with education that is not explained by the resulting increase in income. Their conclusion is that the monetary value of the nonmonetary benefit of education is about three times the size of the actual monetary benefit itself. Therefore one obtains the total individual benefit of education by taking the monetary benefit and multiplying by four. Thus the $16.2 billion in monetary benefit is only 25% of the individual benefit of bridging the Aboriginal education gap, so the actual individual benefit is $64.8 billion.

The results developed in Part I of this study have to be understood in that context. That report, for example, demonstrated that a Métis female who is fifteen in 2011, who goes on to get a bachelor's degree can expect earnings with a discounted present value of $1.5 million, and those earnings sum to $3.2 million undiscounted. Taking account of nonmonetary benefits, however, the discounted present value becomes $6.0 million or $12.8 million undiscounted.

We aren't done. Many would argue that the most important benefits of education are the social benefits that result from such things as lower rates of criminality. This and the previous section have both focused on the benefit of education to the individual, but there are also external benefits to society of having an educated population. That is the subject of the next section.

Also Add External Social Benefits and the Yield Increases to $90.0 Billion

The $64.8 billion arrived at in the previous section is still not the whole story because it only takes account of individual monetary and nonmonetary benefits. An economist would call these internal, as opposed to external, benefits. The internal benefits of education are those which accrue to the person who receives the education. The external benefits are those which accrue to someone else. External benefits may accrue to overall society—e.g. further education reduces criminality—or to another individual—e.g. further education improves childrearing and hence improves the lives of children. Total social benefits include individual monetary, individual nonmonetary, and external social benefits.

The total social benefit of bridging the Aboriginal education gap in Saskatchewan, measured in 2011 dollars, is $90.0 Billion, or $90,000 per person in Saskatchewan.

External benefits tend to be intuitively clear. For example, as noted above, increased education lowers rates of criminality. The reason for this is best explained by the imminent social observer, Bob Dylan, who wrote in his song *Like a Rolling Stone*: "When you've got nothing, you've got nothing to lose." Increased education yields monetary and nonmonetary benefits to the individual which gives an individual something to lose if convicted of crime, which lowers criminality.

Another intuitively clear externality is that further education is associated with lower dependence on welfare and other income support programs. Again, this is an immediate consequence of education's effect on earnings, unemployment rates, and labour force participation rates. By lowering government expenditure on welfare, governments are free to spend that revenue on other things (e.g. health care) or to use it to reduce taxes.

Education increases the rate of economic growth. This is because education increases human capital, which is a factor of production. This effect is external only to the extent that the individual does not receive the resulting income as part of earnings.

Further education also reduces teen childbearing, child abuse and neglect, and improves children's education and health outcomes. That is an internal nonmonetary benefit to the parent to the extent that it improves the parent's happiness, but is external in its benefit for the child.

Education increases civic mindedness. Educated individuals are more likely to vote, stay better informed, and be politically active.

Again, there is a large literature on the external benefits of education. Just as in the previous section of this report, there are significant problems with quantifying and aggregating. McMahon (2004) includes a meta-analysis of measurements of the external benefit to education. For countries in the Organization for Economic Cooperation and Development (basically, the developed countries of the world), the external social benefit equals fourteen ninths of the individual monetary benefit.

Hence, the total social benefit of bridging the Aboriginal education gap in Saskatchewan, measured in 2011 dollars, is:

$$\left(\textit{Social Benefit}\right) = \left(\textit{Individual Monetary Benefit}\right) + \left(\textit{Individual Nonmonetary Benefit}\right) + \left(\textit{External Social Benefit}\right)$$

$$= \left(\$16.2\ \textit{billion}\right) + \left(3 \times \$16.2\ \textit{billion}\right) + \left(\frac{14}{9} \times \$16.2\ \textit{billion}\right)$$

$$= \$90.0\ \textit{billion}$$

The potash industry is universally understood to be critical to the economy of our province. However, the total production of potash in Saskatchewan back to the start of the industry is…four-fifths of $90.0 Billion.

It is easy for a person to lose track of how much money a billion dollars is when the government of Canada is in the process of trying to deal with a multi-billion dollar deficit, and the USA is running a deficit of over a trillion dollars. However, in a province with a population of about a million, $90.0 Billion comes out to $90,000 per person. That, for a family of four, equals $360,000 which is an amount that is sufficient to buy a house.

In the most recent year for which we have data, Saskatchewan's Gross Domestic Product (GDP) was $57.6 billion. The amount of $90.0 Billion is over one and a half times that. However, that comparison is somewhat inappropriate because the $90.0 Billion is a benefit which will accrue over time, and the $57.6 billion is part of an annual flow.

Perhaps a better comparison is to intertemporal sums. The potash industry is universally understood to be critical to the economy of our province. However, the total production of potash in Saskatchewan back to the start of the industry is $72.2 billion measured in 2011 dollars, four-fifths of $90.0 Billion. Similarly, total production of uranium over the life of the Saskatchewan uranium industry, measured in 2011 dollars, is a seventh of $90.0 Billion.

Much of the individual benefit (both monetary and nonmonetary) will flow to Aboriginal people, but the external social benefit will benefit everyone in the province. The external social benefit is:

External Social Benefit

= $\frac{14}{9}$ $16.2 billion = $25.2 billion

That amounts to over $25,000 per person in Saskatchewan, over $100,000 for a family of four: the size of a nice lottery win for every man, woman, and child in the province.

Moreover, this analysis—following the literature—has measured the increase in earnings as an individual monetary benefit, but taxes will be paid on that, and the tax receipt will be an external social benefit. There is a myth that is extremely popular in Saskatchewan that Aboriginal people are not responsible for paying taxes. The myth is somewhat related to reality because many Aboriginal people do not, in fact, pay very much tax because their incomes are well below the poverty line. Moreover, Registered Indians can avoid some taxes: the GST and PST, the tax on cigarettes, and some income tax in restricted circumstances. However, most taxes cannot be avoided as Aboriginal incomes rise.

Total production of uranium over the life of the Saskatchewan uranium industry, measured in 2011 dollars, is a seventh of $90.0 Billion.

Bridging the Aboriginal education gap will generate an increase in earnings of $16.2 billion. In Part III of this study, we will estimate the amount of that which will end up in provincial tax coffers. That amount should, conceptually, be deducted from the individual monetary benefit and added to the external social benefit, leaving the total benefit unchanged, though adding to the proportion of the benefit which accrues to society as a whole.

The Economic Benefit of the 975 Graduates of SUNTEP

The benefit in Saskatchewan of bridging the Aboriginal education gap has been shown in this paper to be $90.0 Billion. That measures the gap as it is today. The purpose of this section is to measure the benefit from SUNTEP up to 2011 in beginning to bridge the Aboriginal education gap.

The first graduates of SUNTEP were in 1984. Since then, there have been 975 graduates, 195 males and 780 females. Part I of this report demonstrated that the individual monetary benefit for Métis to complete university instead of stopping with a high school diploma is $906,864 for females and $690,807 for males, measured in 2011 dollars. Thus the individual monetary benefit is

$$780 \times \$906{,}864 + 195 \times \$690{,}807 = \$842{,}061{,}285$$

That is just part of the economic benefit of SUNTEP. For one thing, the multiples from the previous two sections apply. There are individual nonmonetary benefits of education (for example, improved health and longevity, greater job satisfaction, and increased stability of marriages) which are three times the monetary benefits, so the individual monetary and nonmonetary benefit is

$$\$842{,}061{,}285 \times 4 = \$3{,}368{,}245{,}140$$

which is about $3.4 billion. In addition, there are external social benefits of education (for example, lowered welfare dependence, rates of teen pregnancy, and criminality), which increase the benefit further, to

$$\$842{,}061{,}285 \times \left(4 + \frac{14}{9} \right) = \$4{,}678{,}118{,}250$$

which is about $4.7 billion dollars.

In addition, of course, teachers teach. Through 2011, SUNTEP graduates have provided 8,753 teacher-years of teaching by Aboriginal teachers. That figure is a computation which allows for usual rates of mortality and allows for 25% of SUNTEP graduates to do things other than teaching.

Those 8,753 teacher-years have a substantial benefit for their students, both Aboriginal and non-Aboriginal.

First consider Aboriginal students. In this context, the primary additional impact is the effect that SUNTEP graduates who go on to teach have on the educational attainment for Aboriginal students who see themselves in their Aboriginal teacher and as a consequence find ways to make education work. One of the (many) roles of a teacher is to serve as a role model for his/her students; the effect on Aboriginal students of having an Aboriginal teacher/role model can be profound. Although the literature contains a number of analyses of such role-model effects, the available quantitative analyses are mostly confined to measuring the impact of black teachers on black students, or of female teachers on female students. Most are for the United States or Australia. Even in articles like Thomas Dee (2004), which are stated in more general terms, the underlying data are for blacks in the United States.

Another severe constraint results from the literature predominantly analyzing the impact on educational achievement as opposed to educational attainment. In the literature, educational achievement is measured using test scores, which is a popular subject for researchers in part because it is straightforward to implement.

The question of the impact on educational attainment is far more difficult because a given student may have a variety of teachers and each has different characteristics. How would a researcher measure the effect on the likelihood of graduating—or going on to post-secondary education—of an Aboriginal teacher or group of Aboriginal teachers?

Yet another limitation of the literature, relative to our needs here, is that it tends to focus on variables such as the socio-economic characteristics of a school's catchment area which, again, is straightforward for the researcher to implement.

The literature contains some qualitative statements for the USA about the importance of Aboriginal teachers in encouraging the educational attainment of Aboriginal students. These are based on anecdotal evidence ranging from the experience of the researcher to interviews of Aboriginal teachers or students.

Due to these limitations, the remainder of this section will involve scenarios which involve a wide range of intuitively relevant possibilities.

The effects of Aboriginal teachers on the educational attainment of Aboriginal students will be organized into high, medium, and low scenarios. Let's suppose that the effects are equally likely to be to encourage the completion of high school, technical school, or university. Let's suppose that the encouraged Aboriginal student is equally likely to be Métis or North American Indian, and equally likely to be male or female. Lifetime earnings will be the computed net of the lifetime earnings of an individual who drops out. Using the results of Part I of this study, the increase in lifetime earnings is $714,381, averaged over both Métis and North American Indians, both sexes, and all three levels of educational attainment beyond dropping out. For the low scenario, let's suppose that an Aboriginal teacher affects the educational attainment of one Aboriginal student once every ten years. For the high scenario, let's suppose that it happens every two years. For the medium scenario, let's suppose that it happens once every five years. As noted above, graduates of the SUNTEP program have taught 8,753 teacher years, so 875 students would be affected in the low scenario, 1,751 in the medium, and 4,376 in the high. Multiplication by $714,381 yields the numbers in Table 6.

Table 6. Increase in lifetime earnings that result when SUNTEP graduates affect the educational attainment of Aboriginal students

1. Low Scenario	$625,083,375
2. Medium Scenario	$1,250,166,750
3. High Scenario	$3,126,131,256

Just as previously in this report, there are also individual nonmonetary benefits as well as external social benefits. When they are included, the benefits rise to those shown in Table 7.

Table 7. Benefits that result when SUNTEP graduates affect the educational attainment of Aboriginal students, including monetary and individual nonmonetary benefits as well as external social benefits

1. Low Scenario	$3,472,685,417
2. Medium Scenario	$6,945,370,833
3. High Scenario	$17,367,395,867

There are a variety of additional benefits of having Aboriginal teachers which are not measured in this report. For example, although it is unfortunate that non-Aboriginal and Aboriginal teachers do not typically socialize (Bazylak, 2002), Aboriginal students learn from this. This writer attended high school in the United States during the time of the American civil rights movement, and observed a similar phenomenon: at that time Black and White teachers did not typically socialize. A consequence was that Black students learned that it was

possible to live a happy, productive, prosperous life through education even if some Whites wouldn't "hang out" with you. Similarly for Aboriginal teachers in Saskatchewan today, and Aboriginal students are more likely to learn this if they have an opportunity to observe it in their teachers' behaviour.

… society also needs depictions of Aboriginal people as professionals—doctors, lawyers, nurses, teachers, etc.

Another example: having an Aboriginal teacher—and hence authority figure—is an excellent preparation for the future for non-Aboriginal students. Aboriginal people are typically depicted—by the media and others—in the context of celebrations of their culture. For example, Aboriginal people are commonly depicted using colourful pictures of Aboriginal dancers. However, society also needs depictions of Aboriginal people as professionals—doctors, lawyers, nurses, teachers, etc. I am indebted to Keith Martel, Chairman and CEO of First Nations Bank of Canada, for the point about the critical importance of having depictions of Aboriginal people as professionals. When a non-Aboriginal student has an Aboriginal teacher, it provides excellent preparation for Saskatchewan's demographic future.

The economic benefit through 2011 of the 975 graduates of SUNTEP—the number of graduates thus far—is given in Table 8. It is obtained as the sum of the value of SUNTEP graduates in encouraging further educational attainment for Aboriginal students—from Table 7—and their value of being Aboriginal graduates themselves—from page 36.

Table 8. Benefits that result when SUNTEP graduates affect the educational attainment of Aboriginal students as well as from being Aboriginal university graduates themselves

1. Low Scenario	$8,150,803,667
2. Medium Scenario	$11,623,489,083
3. High Scenario	$22,045,514,117

The value of SUNTEP, measured by the value of its graduates ranges from $8.2 billion in the low scenario, to $11.6 billion in the medium, to $22.0 billion in the high.

The economic benefit through 2011 per SUNTEP graduate, shown in Table 9, is obtained by taking the entries of Table 8 and dividing by the total number of graduates, 975.

Table 9. The benefit through 2011 per graduate of SUNTEP

1. Low Scenario	$8,359,799
2. Medium Scenario	$11,921,527
3. High Scenario	$22,610,784

Thus a SUNTEP graduate has a benefit, including individual monetary, individual nonmonetary, external social, and including the benefits of themselves being Aboriginal graduates and from their encouraging further educational attainment for Aboriginal students that is $8.4 million per graduate in the low scenario, $11.8 million in the medium, and $22.6 million in the high.

Many readers will be surprised at the size of the per-student benefits shown in Table 9. However, these benefits leave out a large portion of the benefits of SUNTEP graduates because they have only included the effect of teaching through 2011. The most extreme example of this limitation would be for the 43 SUNTEP graduates in the 2010-11 academic year. The benefits of their teaching years are not included at all in Table 9.

Closing Comments

A great deal more can be said about all of the points here. One point which has arisen in discussion must be addressed. The Aboriginal education gap has been computed, above, for all ages. That may seem inconsistent with the fact that further education becomes extremely unlikely past a certain point in life.

Three observations about the way the education gap has been computed are apparent.

First, there are proportionately fewer Aboriginal people in the older age groups. Recall that the Aboriginal education gap has been computed relative to the Aboriginal population, which has both higher mortality and higher fertility rates, which tips the age distribution in favour of youth. Consequently, for example, there are 3,034 North American Indians in their sixties in Saskatchewan but there are 13,577 in their twenties.

… bridging the Aboriginal education gap will take decades….As a society, we must respond if Saskatchewan is to continue to be a good place to live.

Moreover, recall that the analysis has been cut off for people at their seventieth birthday.

Finally, observe from Table 4 above that the economic value of a credential becomes much smaller with age (because the remaining time in the labour market is diminished and participation rates are lower). So, for example, a Métis female in the 25-29 cohort who gets a Bachelor's degree will increase her lifetime earnings by $1,465,859 whereas if she is in the 65-69 cohort, only $53,105.

Alternative treatments were tried which—for all of the above reasons—did not change the results appreciably. Alternatives involved picking an age at which adult education was no longer a possibility. Any such choice of date would be both arbitrary and offensive to older people (including this writer).

Realistically, bridging the Aboriginal education gap will take decades. The feminist movement resulted in—as noted in Part I of this report—females having a larger financial incentive to seek education than males. It took decades before this incentive resulted in females being, on average, better educated than males (as shown in Table 2, above). It will take decades before the Aboriginal education gap is bridged and then the difference in financial incentives results in Aboriginal people in Saskatchewan being better educated than non-Aboriginal. Sadly, mortality will guarantee that by that time today's elderly will have long since passed from the Aboriginal education gap.

There is probably no better way to end Part II of this study than by quoting an ancient Chinese proverb which goes like this.

If you want to change the world for a year,
plant rice.
If you want to change the world for ten years,
plant trees.
If you want to change the world forever,
teach.

Our province is in a process of fundamental demographic change. As a society, we must respond if Saskatchewan is to continue to be a good place to live. The response has to be based on education. SUNTEP has a large impact because SUNTEP teaches the teachers.

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Part III: Executive Summary and Macroeconomic Addendum

Executive Summary of the Study

Bridging the Aboriginal education gap is the most significant economic challenge confronting Saskatchewan. It is also our greatest economic opportunity.

Where else in the developed world can so much money be made just from successfully creating the conditions that encourage a group of people to complete high school? Of course, even more money will be made if they also successfully go beyond high school, but high school is a lucrative start.

This study defines Saskatchewan's Aboriginal education gap as the difference between the actual educational attainment of Aboriginal people and what the level would be if they had the same average levels of educational attainment as non-Aboriginal people. The definition uses current population levels. However, the Aboriginal population is disproportionately young with a high fertility rate, so it is growing rapidly. If account were taken of future populations, the economic benefit of bridging the Aboriginal education gap would be an order of magnitude larger.

The definition of the Aboriginal education gap avoids questions associated with the adequacy of the educational level of non-Aboriginal people. Saskatchewan's levels of educational attainment trail behind the Canadian average and that of most other provinces. In fact, we need for the educational levels of Aboriginal people to exceed, not equal, the current educational level of the non-Aboriginal population. If account were taken of the inadequacy of non-Aboriginal educational levels, the Aboriginal education gap would have been even larger, as would the economic benefit of bridging it.

Consequently, although the economic benefits shown in this study are large, they are underestimates. The actual economic benefits of bridging the Aboriginal education gap are considerably greater than we have shown.

… although the economic benefits shown in this study are large, they are underestimates.

The base amount of the benefit is $16.2 billion dollars. If we bridge the Aboriginal education gap, the individual monetary benefit would be $16.2 billion, from the increase in the present value of the earnings of Aboriginal people, measured in 2011 dollars.

However, the benefit of education is more than the individual monetary benefit. In addition, education has an individual nonmonetary benefit. For example, there is a consumption value of education because many people enjoy both learning and attending educational institutions.

There is an extraordinarily wide array of additional benefits: education improves things as diverse as personal prestige and the amount of fringe benefits.

Education lowers unemployment rates—which is partly an individual monetary benefit, but is also nonmonetary because periods of unemployment have been shown to have a negative psychological effect which exceeds what can be explained by reduced earnings.

Education improves an individual's decision-making ability, and a number of nonmonetary benefits result. For example, the individual is less likely to engage in self-destructive behaviours (e.g. smoking). As a consequence, health is improved and longevity is increased.

Although education does not make an individual less impatient, it does make an individual less myopic. The process of education leads to individuals being better at visualizing future gains, so they are more willing to endure short-term pain to bring about long-term gain.

Some of the measured nonmonetary benefits of education result from mechanisms that are not well understood. For example, further education lowers stress even though it would seem that it is associated with jobs with greater responsibility and stress. Education adds to the strength of marriages and lowers the probability of divorce.

In short, education transforms an individual's life.

In short, education transforms an individual's life. How can that transformation be valued? That valuation is performed for the first time in a ground-breaking analysis that was recently published in one of the top journals in economics (Oreopoulos & Salvanes, 2011). (Canadians can be proud because the lead author is an economist from the University of Toronto.) The authors distinguish between the total individual benefit (measured as personal satisfaction with life) that results from more education and, separately, the benefit that results from higher income. Then they measure the increase in income that results from education. The nonmonetary benefit of education is then the individual benefit of education that is not explained by the resulting increase in income. They conclude that the individual nonmonetary benefit is three times the individual monetary benefit.

Consequently, bridging the Aboriginal education gap will yield a benefit to Aboriginal people in Saskatchewan of $16.2 + 3 x $16.2 = $64.8 billion dollars, measured in 2011 dollars.

In arriving at the amount $64.8 billion, however, we have left out the benefits that many would regard as the most important—the external social benefits. These are the benefits which accrue to society and not to the individual. Again, there is a wide array of additional benefits. Education lowers rates of criminality and incarceration. Education increases the likelihood that an individual will effectively use contraception and delay parenthood, lowering rates of teen pregnancy. For those who choose to have children, having educated parents tends to improve the quality of the life of the child. By increasing the strength of marriages, education not only improves the life of the individual—an individual nonmonetary benefit—but also the lives of the spouse and any children—an external social benefit.

Reflecting its importance, there is a large literature which measures the external social benefit of education. A book chapter by McMahon (2004) includes a meta-analysis of that literature and concludes that the external social benefit is fourteen-ninths of the individual monetary benefit. Hence, the benefit of closing the Aboriginal education gap in Saskatchewan is

$$\left(\begin{matrix}\textit{Social}\\ \textit{Benefit}\end{matrix}\right) = \left(\begin{matrix}\textit{Individual}\\ \textit{Monetary}\\ \textit{Benefit}\end{matrix}\right) + \left(\begin{matrix}\textit{Individual}\\ \textit{Nonmonetary}\\ \textit{Benefit}\end{matrix}\right) + \left(\begin{matrix}\textit{External}\\ \textit{Social}\\ \textit{Benefit}\end{matrix}\right)$$

$$= \left(\$16.2\ \textit{billion}\right) + \left(3\ x\ \$16.2\ \textit{billion}\right) + \left(\frac{14}{9}\ x\ \$16.2\ \textit{billion}\right)$$

$$= \$90.0\ \textit{billion}$$

That amount is large—twenty percent more than all of our sales of potash in the history of Saskatchewan, for example. Bridging the Aboriginal education gap would amount to a nice-sized lottery win for every man, woman, and child in the province.

Why are the amounts so large? The foundation of the computation is the effect of education on earnings. Across North America and around the world, Aboriginal people have the highest financial return to education because their earnings increase the most. The reason for this is straightforward. Without an education, Aboriginal

people make dramatically less than non-Aboriginal people. With an education, however, their earnings largely catch up. This is the Information Age, so it is not surprising that education, on average, increases individual earnings. However, Aboriginal earnings increase by more because they also catch up with non-Aboriginal earnings.

In fact, the highest financial rate of return to education is for Aboriginal females. Without an education, Aboriginal females make even less than Aboriginal males. With an education, their earnings increase, just as it does (on average) for all of us; but Aboriginal females also catch up with males and catch up with non-Aboriginal people so they receive a triple financial benefit from education.

The literature which measures the financial return to education is largely stated in terms of percentage rates of return. However compelling those percentages may be to professional economists, they tend to mask just how much money is actually on the line. The principal contribution of Part I of this study (Howe, 2011a) is to use techniques from forensic economics in order to measure the effect of education on individual earnings in dollars and cents. It measures the discounted present value of lifetime earnings for hypothetical Saskatchewan residents who are fifteen years old in 2011. Earnings depend on whether the individual: is male or female; is non-Aboriginal, Métis, or North American Indian; drops out, completes high school, completes a program in a technical school, or completes university. Tables 1, 2, and 3 of Part I show the discounted present value of lifetime earnings of each of these individuals. Then Tables 4, 5, and 6 show how much earnings increase with education: if the individual gets a high school diploma (or subsequently earns high school equivalency), if the individual earns a high school diploma and then goes on to complete a technical school program, or if an individual earns a high school diploma and then goes on to complete a university program.

The results from Part I are shown in Table 1, below, stated in terms of the increase in lifetime earnings which result from educational attainment.

Table 1. Increase in the present value of lifetime earnings from educational attainment in Saskatchewan, measured in 2011 dollars.

	Male	Female
	Completing high school instead of dropping out, with no further formal education	
Non-Aboriginal	$291,500	$247,951
Métis	$428,554	$349,505
North American Indian	$434,739	$277,505
	Completing high school instead of dropping out, and then completing technical school	
Non-Aboriginal	$525,286	$398,868
Métis	$695,990	$529,333
North American Indian	$637,488	$555,410
	Completing high school instead of dropping out, and then completing university	
Non-Aboriginal	$884,232	$1,104,314
Métis	$1,119,361	$1,256,369
North American Indian	$1,107,733	$1,180579

Note that the increases are large. Averaging over sex and Aboriginal identity, finishing high school, adds another $338,292 to lifetime earnings. If, instead of dropping out, an individual completes high school and then also completes a program at a technical school, then lifetime earnings on average increase $557,063. If high school is followed by completion of university, then lifetime earnings on average increase $1,108,765. All of these are measured in 2011 dollars. All are present values, computed using a real interest rate of 3%.

So, a lot is on the line financially when people make their educational choices.

Table 1 is stated in terms of the monetary benefit to the individual for educational attainment. As noted above, there are also nonmonetary benefits of educational attainment and also external social benefits. The result of both is to multiply each of the entries in Table 1 by $4 + \frac{14}{9}$. The results are shown in Table 2.

Table 2. The individual monetary and nonmonetary benefits as well as the external social benefit of education in Saskatchewan

	Male	Female
		Completing high school instead of dropping out, with no further formal education
Non-Aboriginal	$1,619,444	$1,377,506
Métis	$2,380,856	$1,941,694
North American Indian	$2,415,217	$1,541,694
		Completing high school instead of dropping out, and then completing technical school
Non-Aboriginal	$2,918,256	$2,215,933
Métis	$3,866,611	$2,940,739
North American Indian	$3,541,600	$3,085,611
		Completing high school instead of dropping out, and then completing university
Non-Aboriginal	$4,912,400	$6,135,078
Métis	$6,218,672	$6,979,828
North American Indian	$6,154,072	$6,558,772

Taking account of individual monetary, individual nonmonetary, and external social benefits, education pays big-time! Again averaging over sex and Aboriginal identity, finishing high school adds benefits of $1.9 million per student. Finishing high school and then technical school adds $3.1 million per student. Finishing high school and then university adds $6.2 million per student.

Examining the details of Tables 1 and 2, observe that the highest rates of return for education are for Aboriginal people and for females. As noted above, that is a result which has been obtained from around the world in studies ranging from the developed to the undeveloped world. The reason, again, is that without an education, both groups earn little but further education causes their earnings to catch up.

Scandinavian countries turn out to be the exceptions which prove the rule. Those countries have far greater income equality than observed elsewhere, so people with lower levels of education tend to have levels of

incomes that do not vary greatly with sex and ethnicity. Consequently, the above relationships sometimes break down for Scandinavian countries.

Although the size of the Aboriginal education gap is large, it would have been larger without SUNTEP.

In Saskatchewan, like the world outside Scandinavia, the highest financial returns to education are for Aboriginal people and—starting with university—for women.

Although the size of the Aboriginal education gap is large, it would have been larger without SUNTEP.

The first graduates of SUNTEP were in 1984. Since then, there have been 975 graduates: 195 males and 780 females. Part I of this report demonstrated that the individual monetary benefit for Métis to complete university instead of stopping with a high school diploma is $906,864 for females and $690,807 for males, measured in 2011 dollars. As noted above, for every dollar of individual monetary benefit, there is $(4 + \frac{14}{9})$ times that in benefits including individual nonmonetary and external social benefits. Thus the benefit is about $4.7 billion:

$$(780 \times \$906{,}864 + 195 \times \$690{,}807) \times (4 + \tfrac{14}{9}) = \$4{,}678{,}118{,}250$$

That benefit is just from the graduates of SUNTEP, and would be computationally the same whether they were Métis university graduates in education or commerce. But, of course, teachers teach. Through 2011, SUNTEP graduates have provided 8,753 teacher-years of teaching by Aboriginal teachers. There are a number of benefits from having Aboriginal teachers. However, the principal benefit in the current context occurs when Aboriginal students see themselves in their Aboriginal teacher and find a way to make education work. Aboriginal teachers increase the level of educational attainment of their Aboriginal students. Part II of this study (Howe, 2011b) considered three levels of this impact, organized into high, medium, and low scenarios. Again, the effect of educational attainment by Aboriginal students includes individual monetary, individual nonmonetary, and external social benefits. Those effects are shown in the following table for each of the three scenarios.

Table 3. Benefits that result from SUNTEP graduates affecting the educational attainment of Aboriginal students

1. Low Scenario	$3,472,685,417
2. Medium Scenario	$6,945,370,833
3. High Scenario	$17,367,395,867

What are the benefits of SUNTEP graduates thus far? Sum the $4.6 billion benefit shown above with the results shown in Table 3. The results are shown in Table 4.

Table 4. Benefits that result from SUNTEP graduates affecting the educational attainment of Aboriginal students as well as from being Aboriginal university graduates themselves

1. Low Scenario	$8,150,803,667
2. Medium Scenario	$11,623,489,083
3. High Scenario	$22,045,514,117

The value of SUNTEP, measured by the value of its graduates ranges from $8.2 billion in the low scenario, to $11.6 billion in the medium, to $22.0 billion in the high.

The economic benefit through 2011 per SUNTEP graduate, shown in Table 5, is obtained by taking the entries of Table 4 and dividing by the total number of graduates, 975.

Table 5. The benefit through 2011 per graduate of SUNTEP

1. Low Scenario	$8,359,799
2. Medium Scenario	$11,921,527
3. High Scenario	$22,610,784

Thus the 975 SUNTEP graduates thus far have a benefit, including individual monetary, individual nonmonetary, external social, and including the benefits of themselves being Aboriginal graduates and from their encouraging further educational attainment for Aboriginal students that is $8.4 million per graduate in the low scenario, $11.9 million per graduate in the medium, and $22.6 million per graduate in the high.

Again, it should be stressed that these benefits are limited to the 8,753 teacher-years provided by SUNTEP graduates thus far. It does not include the future teaching-years of existing graduates. Thus, the benefits per graduate shown in Table 5 are underestimates.

Addendum: A Macroeconomic Analysis of the First Ever Made-in-Saskatchewan Boom

For the last one-hundred years, economic booms in Saskatchewan have been caused by the luck of a resource discovery or by changes that are external to the provincial economy: caused either by the increase in the price of a resource or by a particular technological innovation. Examples include the following. A resource-price boom was caused by the increase in grain prices which occurred after the USA began to sell wheat to the USSR in the early 1970s. A technological-change boom occurred following the solution of the technological problem which unlocked the Blairmore formation and allowed potash mining in Saskatchewan. An (ongoing) resource-discovery boom was caused by the discovery of the Bakken oil field covering parts of southern Saskatchewan, North Dakota, and Montana. All of these booms have affected the Saskatchewan labour market principally by shifting the labour demand curve to the right.

The improvement in the educational qualifications of Saskatchewan's Aboriginal population, on the other hand, will cause a boom which will be structurally different. The closing of the Aboriginal education gap will shift the labour supply curve to the right. For the first time, Saskatchewan's economy will experience a made-in-Saskatchewan boom. That will be different from previous booms in a number of ways. For example it is reasonable to expect that it will have greater permanence than previous booms.

For the first time, Saskatchewan's economy will experience a made-in-Saskatchewan boom.

The impact on earnings, quantified in Part I of this study, will cause indirect impacts. For example, the increase in earnings will cause an increase in consumer spending which will result in an increase in retail sales. That increase in retail sales will increase employment in retail trade, which will cause a further increase in income. That further increase in income will cause further increases in retail sales, and so forth. This is an example of the workings of the familiar circular flow of income, a feedback loop discussed in macroeconomic theory books. Another example is that the increase in earnings causes an increase in housing investment which will cause increased employment in construction which will cause further increases in earnings, and so forth. The intermediate macroeconomic theory book by Mankiw and Scarth (2011) provides an excellent discussion of these issues in a Canadian context.

The increase in earnings identified in Part II is a direct effect. The indirect effects are the other increases in economic activity which occur as a consequence. The economic impact, as measured in this addendum, will be the sum of both parts.

It is important to note that this is only a partial macroeconomic impact of SUNTEP. The total macroeconomic impact would include other things—e.g. the impact of employment and of the expenditures of funds by SUNTEP—which will not be considered. Our analysis here will measure the macroeconomic impact of the additional earnings identified in Part II of this study.

So why is this analysis put in an addendum, instead of taking center place in the study? SUNTEP, as noted above, has begun the bridging of the Aboriginal education gap, which changes the economy by shifting the labour supply curve to the right. A consequence is that the economic impact of SUNTEP is best understood from the perspective of microeconomic theory, which studies such things. This addendum will apply macroeconomic theory to the analysis of the effect of SUNTEP. This macroeconomic analysis should be regarded as proximative.

That point is worth emphasizing. Part II concluded that closing Saskatchewan's Aboriginal education gap would have the direct effect of yielding $90.0 Billion in benefits and that—under the medium scenario—SUNTEP had directly produced $11.6 billion of benefits. Those conclusions are accurate. This addendum concludes, for example, that the impact of bridging the Aboriginal education gap is to increase the revenue of the provincial government

by $7.8 billion, and SUNTEP's activities thus far have increased revenue in the range of $0.9 billion to $1.9 billion. That conclusion is indicative of the size of the effect, but proximative.

Part II is organized around quantifying three direct benefits of education, two of which must be dropped as we move into this addendum. The three benefits are: the individual monetary benefit (the increase in individual earnings); the individual nonmonetary benefit (for example, higher prestige, greater job satisfaction, and improved health); and the external social benefit (for example, reduced criminality, lower rates of teen pregnancy, and increased civic participation). The circular flow of income which will be used in Part III to measure the economic impact, only applies to the individual monetary benefit.

The nonmonetary individual and the external social benefits—which are shown in Part II to make up the majority of the benefit of education—are enhanced by their own feedback loops, in much the same way that the circular flow of income enhances the effect of earnings. For example, lower rates of teen pregnancy set a personal example of sexual responsibility to peers, which further lowers the rate of teen pregnancy, which in turn leads to an even further lowering. Similarly for criminality. Greater job satisfaction has peer effects too, causing others to seek more satisfying jobs. However, macroeconomics is about the monetary circular flow, so only the individual monetary benefits will be analyzed in this addendum. This is not to deny the importance of the other benefits of education, but rather to reflect the nature of macroeconomics.

The analysis uses the Saskatchewan Impact Model (SIM) to compute the economic impact of SUNTEP. SIM, which was developed by the writer in a sequence of projects which span the previous three decades, is a macroeconometric model of Saskatchewan. It consists currently of 123 equations which simulate the intertemporal dynamics of the economy of Saskatchewan. It has two main sub-models. One sub-model is used for short- and medium-term macroeconomic analyses. The other is used for long-term analyses. SIM is implemented with EViews, an industry standard econometric forecasting program, discussed further at www.eviews.com.

Discussion of the methodology for building macroeconometric simulation models can be found in Almon (1989), Pindyck and Rubinfeld (1998) and Fair (1984, 1994, 2004), in increasing order of difficulty. A very readable discussion of several of the important methodological issues can be found in Fair (2002). One of the advantages of using SIM, is that the impact is stated in terms of standard macroeconomic variables from the provincial income and product accounts (available from Saskatchewan Bureau of Statistics at www.gov.sk.ca/bureau.stats/) such as GDP and Personal Disposable Income. In fact, SIM is structured to show how the economy moves by showing what the entries in the provincial income and product accounts would be. More about social income and product accounting can be found in any intermediate macroeconomic theory textbook.

There are two different methodologies to use a macroeconometric model to measure the impact of a project. In one, a base forecast is prepared from which the project is excluded. Then an alternative forecast is prepared which includes the project. The economic impact of the project is the difference between the two forecasts.

The alternative methodology involves using the model to compute multipliers which show, for example, how much additional GDP there is per dollar of the size of the project. The project's impact on GDP is obtained as the size of the project times the GDP multiplier. Usually, the multiplier analysis should be avoided because of the difficulty of deciding on a single measure of the size of a project. In this case, we are focusing on the impact of SUNTEP on the earnings of individuals, which is a single measure. Thus the impact of SUNTEP is obtained as the multipliers times the increase in earnings.

Therefore, as noted above, it must be emphasized again that the following analysis is leaving out part of the macroeconomic impact of SUNTEP. For example, part of the direct impact of SUNTEP is due to the pay of employees who teach students in the SUNTEP program. Those payments, too, would generate macroeconomic impacts, but those impacts are not included in the following analysis. Similarly, the construction costs of the

buildings in which SUNTEP classes are taught, the expenditures by the students on materials (books, etc.), the expenditure by the SUNTEP program on materials, and other instructional expenditures (e.g., SUNTEP's proportion of the library and computer infrastructure) would all generate macroeconomic impacts. Those impacts are not included here.

In order to calculate the long run multipliers from an exogenous increase in earnings, an additional $1 billion, in 2011 dollars, was added to the variable wages, salaries, and supplementary labour Income in SIM. (For the last several years, the variable has been somewhat above $20 billion per year.) The long-run sub-model was utilized to calculate the resulting long-run impact. The multipliers are presented in terms of those effects per dollar of the increase in earnings. The multipliers are reported in Table 6.

It must be stressed that the multipliers in Table 6 apply only to long-term impacts. For example, one of the effects behind the above multipliers involves the long-run effect of saving. When earnings increase, some of the increase is saved, increasing net worth, and hence increasing income from interest and dividends. Some of the saving will be in the form of contributions to RRSPs or defined contribution pension plans, so the interest and dividends accumulate in a pension plan. Some will be in the form of the purchase or renovation of owner-occupied housing, which generates an "imputed rent" which is added to personal income. In the long term, the increase in interest, dividends, and imputed rents can exceed the initial increase in earnings. However, note that this effect would be negligible in the short-run.

Another factor determining that these are long-term multipliers has to do with expectations. The multipliers in Table 6 assume that the expectations of economic agents have fully adjusted.

Table 6. Long-term Saskatchewan multipliers for an increase in earnings

Variable	Multiplier
Expenditure Variables in 2002 Dollars	
Gross Domestic Product	1.18
Personal Expenditure	1.37
Gross Fixed Capital Formation, Housing	0.18
Gross Fixed Capital Formation, TCU	0.05
Gross Fixed Capital Formation, Government	0.06
Value of the Physical Change in Inventories	2.3×10^{-3}
Government Expenditure, Provincial and Local	0.42
Imports	0.90
Income Variables in 2011 Dollars	
Personal Income	2.09
Wages and Salaries	1.48
Other Personal Income	0.44
Current Transfers to Persons	0.17
Current Transfers to Government	0.42
Personal Disposable Income	1.67
Personal disposable Income in 2002 Dollars	1.45
Miscellaneous Variables	
Employment, person years	1.5×10^{-5}
Provincial Government Revenue in 2002 Dollars	0.49

Moreover, the multipliers are only for an increase in earnings, which has a large direct impact because wages and salaries are, dollar for dollar, a part of GDP on the income side of the accounts. A dollar spent of investment in machinery—on the expenditure side—on the other hand, would likely be imported provincially, increasing imports, and hence reducing the direct impact.

Whereas cognizanti may be surprised at the large size of the multipliers in Table 6 (taken off-guard by the fact that they are long term) others may be surprised at how small they are. Many readers, having computed multipliers from simple models in their introductory or intermediate macroeconomic theory courses, expect multipliers to equal five or more. In the real world, multipliers are much smaller than that. Using macroeconomic terminology, the real world contains automatic stabilizers which lower the values of multipliers. The largest automatic stabilizer results from the import variable. In our increasingly globalized world, imports are a major leakage out of the circular flow in a provincial economy, which reduces the size of multipliers. That reduction is appropriate: the indirect impact on Saskatchewan will be minimal when a wage-earner spends their wage on a car made in Ontario, a home entertainment system made in China, or a vacation in Alberta.

Examine the details of Table 6. When earnings increase, there is an increase in economic activity. Begin with the income variables. The variable measuring wages and salaries increases due to the increase in earnings. For every dollar increase in earnings—the direct effect—wages and salaries would increase by a dollar plus another 48 cents from the indirect effect. Other personal income increases principally due to the effect of savings on interest, dividends, and imputed rent. The current transfers to government variable consists largely of income tax payments, which increase with the increase in income. The variable measuring current transfers to persons increases because of increases in Canada Pension Plan payments that result from the increase in income. (Payments to individuals of the benefits from public pensions are treated in the accounts as a transfer from government.) The change in income equals the sum of the changes in wages and salaries, other personal income, and current transfers to persons. The increase in personal disposable income equals the increase in personal income minus the increase in current transfers to government. The income variables are measured in 2011 dollars—which are current dollars at the time of this writing. Following current conventions in Canada, constant dollar variables are measured in 2002 dollars. The $1.67 increase in personal disposable income measured in 2011 dollars, translates into a $1.45 increase in 2002 dollars.

When earnings increase, there is an increase in economic activity.

Next, examine the expenditure variables in Table 6. The $1.45 increase in 2002 dollar personal disposable income brings about a $1.37 increase in personal expenditure, which is the consumption variable in the accounts. There is an increase in three types of gross fixed capital formation—fixed investment in structures and equipment. Investment in housing increases principally because of the increase in income, which in turn causes a small increase in investment in TCU (the Transportation, Communication, and Utilities sector). There is an increase in government investment caused by an increase in government revenue. There is a negligible increase in the value of the physical change in inventories (inventory investment). Current expenditure by provincial and local governments increases due to the increase in government revenue. Imports increase due to the import intensity of almost all of the components of expenditure. The increase in GDP equals the sum over all the components, except the increase in imports is subtracted.

The increase in economic activity from an additional dollar of earnings also causes a tiny but important increase in employment, of only fifteen millionths of a person-year. This effect is tiny per dollar, but become significant for large direct effects. The revenue of the provincial government (measured by the Government of Saskatchewan combined funds total budgetary revenue, deflated to 2002 dollars using the implicit price index for government expenditure) increases by 49 cents.

Table 7 shows the direct plus indirect economic effects of bridging the Aboriginal education gap. The numbers are obtained as the above multipliers multiplied by the $16.2 billion increase in earnings that would occur—the individual monetary benefit identified in Part II of this study.

Begin examining Table 7 with components of GDP, measured in millions of 2002 dollars. Closing the Aboriginal education gap would cause GDP to increase by $19.1 billion. The increase would result from a $22.1 billion increase in consumption, an increase in fixed investment of $4.6 billion (principally housing), and an increase in inventory investment of $38 million. There would also be an increase in current expenditure by provincial and local governments which would result from the increase in tax revenue. The increase in imports of $14.5 billion is subtracted.

Next examine the components of income. Personal income would increase by $33.7 billion. The increase in wages and salaries of $23.8 billion includes the increase in earnings of $16.2 billion which is the direct effect of closing the Aboriginal education gap. Other personal income increases principally from the effect on savings and hence on interest, dividends, and imputed rent. The variable measuring current transfers to persons increases because the increase in personal income triggers—in the long run—an increase in payments from the Canada Pension Plan. The variable measuring current transfers to government increases from payments of income tax. Subtracting the increase in current transfers to government from the increase in personal income yields the increase in personal disposable income of $26.9 billion. Converting to 2002 dollars, personal disposable income increases by $23.5 billion. That is the principal cause of the increase in consumption and investment that brought about the increase in GDP shown earlier in the table.

Table 7. The economic impact of closing the Aboriginal education gap

Variable	Impact
Expenditure Variables in Millions of 2002 Dollars	
Gross Domestic Product	$19,058
Personal Expenditure	$22,088
Gross Fixed Capital Formation, Housing	$2,845
Gross Fixed Capital Formation, TCU	$859
Gross Fixed Capital Formation, Government	$921
Value of the Physical Change in Inventories	$38
Government Expenditure, Provincial and Local	$6,833
Imports	$14,526
Income Variables in 2011 Dollars	
Personal Income	$33,719
Wages and Salaries	$23,849
Other Personal Income	$7,180
Current Transfers to Persons	$2,690
Current Transfers to Government	$6,776
Personal Disposable Income	$26,943
Personal Disposable Income in millions of 2002 Dollars	$23,492
Miscellaneous Variables	
Employment, person years	248,717
Provincial Government Revenue in 2002 Dollars	$7,849

Table 8. The economic impact of SUNTEP through 2011

	Scenario:		
Variable	Low	Medium	High
Expenditure Variables in Millions of 2002 Dollars			
Gross Domestic Product	$1,731	$2,468	$4,681
Personal Expenditure	$2,006	$2,860	$5,425
Gross Fixed Capital Formation, Housing	$258	$368	$699
Gross Fixed Capital Formation, TCU	$78	$111	$211
Gross Fixed Capital Formation, Government	$84	$119	$226
Value of the Physical Change in Inventories	$3	$5	$9
Government Expenditure, Provincial and Local	$621	$885	$1,678
Imports	$1,319	$1,881	$3,568
Income Variables in 2011 Dollars			
Personal Income	$3,062	$4,367	$8,282
Wages and Salaries	$2,166	$3,088	$5,858
Other Personal Income	$652	$930	$1,763
Current Transfers to Persons	$244	$348	$661
Current Transfers to Government	$615	$877	$1,664
Personal Disposable Income	$2,447	$3,489	$6,618
Personal Disposable Income in millions of 2002 Dollars	$2,133	$3,042	$5,770
Miscellaneous Variables			
Employment, person years	22,586	32,209	61,088
Provincial Government Revenue in 2002 Dollars	$713	$1,016	$1,928

The impact on employment is to increase employment by just less than a quarter of a million person years. The coffers of the provincial government would be increased by its share of the payments of personal income tax as well as by the increase in other taxes that the provincial government collects which increase with the increases in economic activity.

Table 8 shows the macroeconomic impact of SUNTEP thus far in its existence. It sums the direct effect on earnings of the 975 graduates ($842,061,285 from Part II) and the direct effect on earnings resulting from the increased educational attainment of Aboriginal students as the SUNTEP graduates have taught thus far in their careers. The impacts are organized into the high, medium, and low scenarios from Table 6 of Part II.

If should be emphasized again that this economic impact is only for the 975 graduates of SUNTEP thus far and only for the teaching they have performed thus far in their careers. If account were taken of the future teaching they will do before they retire, the following numbers would be even larger. If account were taken of future graduates of SUNTEP, the results would be larger still.

First examine the impact of SUNTEP under the medium scenario. Since its first graduate in 1984, SUNTEP has increased provincial Gross Domestic Product by $2.5 billion. Examining the components, consumption has been increased by $2.9 billion and fixed investment by $0.6 billion. There has been a negligible increase in inventory investment. Current expenditure by provincial and local governments has been $0.9 billion higher due to higher tax revenue. The increase in imports has been $1.9 billion.

Examining income, personal income has been increased by $4.4 billion. The component measuring wages and salaries has been increased the most, $3.1 billion. Other personal income has been increased by $0.9 billion. The variable measuring current transfers to persons has been increased by $0.3 billion and the variable measuring current transfers to government has been increased by $0.9 billion. Personal disposable income has been increased by $3.5 billion in 2011 dollars, or $3.0 billion in 2002 dollars. Employment has been increased by 32 thousand person years. The revenue of the provincial government has been increased by $1.0 billion.

The previous two paragraphs are about the medium scenario. The impact of SUNTEP is about 30% lower in the low scenario and about 90% higher in the high.

Returning to the medium scenario, the effect of SUNTEP on the revenue of the provincial government per graduate is obtained by dividing the increase in provincial revenue by 975. On average, based only on the period through 2011, each SUNTEP graduate has increased provincial government revenue by $731,029 in the low scenario, $1,042,487 in the medium, and $1,977,218 in the high, measured in 2002 dollars.

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