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..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0^s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p}	preliminary
^{r}	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E}	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

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Literacy and numeracy among off-reserve First Nations people and Métis: Do higher skill levels improve labour market outcomes?

by Paula Arriagada and Darcy Hango

Overview of the study

This article examines the literacy and numeracy skills of off-reserve First Nations and Métis adults, focusing on the factors and labour market outcomes associated with higher skill levels. In this study, individuals in the higher range for literacy and numeracy are defined as those who scored level 3 or higher (out of 5 levels) in tests administered by the 2012 Programme for the International Assessment of Adult Competencies (PIAAC).

- Off-reserve First Nations and Métis adults have lower literacy and numeracy scores than non-Aboriginal adults. For example, just over one-third (35%) of off-reserve First Nations people and 50% of Métis aged 25 to 65 had higher literacy scores (level 3 or higher), compared with 57% among non-Aboriginal adults.
- For off-reserve First Nations, Métis and non-Aboriginal adults, a higher level of education was associated with higher literacy and numeracy skills. Among those with a university degree, however, the proportion of off-reserve First Nations adults with higher skills remained lower than that of non-Aboriginal adults.
- Among those who had higher literacy skills (level 3 or higher), off-reserve First Nations adults aged 25 to 54 had a 75% probability to be employed, compared with 87% among Métis adults and 91% among non-Aboriginal adults.
- Non-Aboriginal adults aged 25 to 54 with lower literacy skills (level 2 or lower) were more likely to be employed than off-reserve First Nations adults with higher skills (level 3 or higher), even after accounting for other factors related to the probability of employment.
- Among those who were employed, off-reserve First Nations and Métis workers who had higher skill levels were as likely as their non-Aboriginal counterparts to work in a managerial or professional occupation.

Introduction

Existing research shows that higher cognitive skills, such as literacy and numeracy, are associated with greater labour force participation and higher earnings,[1] as well as a positive relationship with self-reported health status.[2] However, this research has not focused specifically on the Aboriginal population in Canada.

The limited research available has shown that, at the national level, proficiency scores in literacy and numeracy are lower among the Aboriginal population than the non-Aboriginal population.[3] Since the association between education and skills is strong,[4] it is possible that the skills gap between these populations is partly attributed

to differences in educational outcomes. For example, close to one-half (48%) of Aboriginal people aged 25 to 64 had a postsecondary qualification in 2011, compared with almost two-thirds (65%) of their non-Aboriginal counterparts. Furthermore, nearly 3 in 10 (29%) Aboriginal people had no certificate, diploma or degree, compared with 12% of non-Aboriginal people in the same age group.[5]

The impact that literacy and numeracy have on economic and social outcomes may be especially important for the Aboriginal population as they are typically younger and have a faster rate of population growth than the non-Aboriginal population. In 2011, 46% of Aboriginal people were aged 24 and under, compared with 30% of the non-Aboriginal population.[6] The relatively larger proportion of Aboriginal youth, along with their generally lower levels of education and skills than their non-Aboriginal counterparts, may have important labour market implications for this population. Past research confirms that, in general, the Aboriginal population does not fare as well in the labour market as the non-Aboriginal population, both in terms of employment and earnings.[7] Given the lower educational attainment of the Aboriginal population, it stands to reason that they may be even more vulnerable to downturns in the economy. It is therefore important to understand the factors that may help the Aboriginal population become more fully integrated into the labour market.

Data for this article are from the 2012 Programme for the International Assessment of Adult Competencies (PIAAC), a large survey on the information-processing skills of youth and adults aged 16 to 65 in every province and territory in Canada and 23 other countries.[8] PIAAC data are well-suited for the purposes of this study due to oversampling of Aboriginal people living off reserve in large urban population centres in Ontario, Manitoba, Saskatchewan and British Columbia, as well as Aboriginal people living in Yukon, Northwest Territories and Nunavut. In addition, PIAAC provides an objective assessment of various cognitive skills such as literacy and numeracy.[9]

This article begins by providing a profile of the skills of First Nations people living off reserve, Métis and the non-Aboriginal adult population aged 25 to 65.[10] The second part of this article examines the factors associated with higher literacy and numeracy skill levels for off-reserve First Nations people and Métis as well as the non-Aboriginal population. The final section focuses on employment outcomes and how they relate to higher skill levels within the core working-age group of adults aged 25 to 54.

It is important to note that the non-Aboriginal population excludes immigrants as they tend to score lower in numeracy and literacy. This might be explained by language used by immigrants as PIAAC was administered in either English or French.[11] Readers should also note that Inuit respondents are excluded from the analysis due to their smaller sample size.[12]

In PIAAC, respondents were tested on their information-processing skills and obtained scores ranging from 0 to 500. Literacy refers to respondents' ability to understand and use written text both in print and electronic format, while numeracy refers to adults' ability to evaluate, use, and communicate numerical and mathematical concepts.[13] The higher the score, the better able respondents are to process, understand and use complex information. Results can either be presented as an average proficiency of the population or across levels (ranging from below level 1 to level 5).

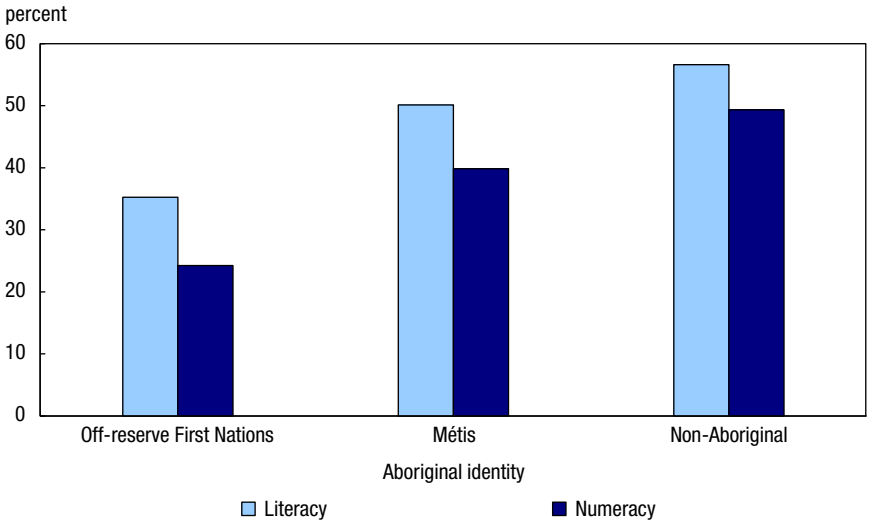
For the purposes of this particular study, the focus is on respondents who have higher levels of literacy and numeracy, specifically those who are at level 3 or higher (see *Data sources, methods and definitions*). Individuals who score a level 3 or higher have been shown to have a better mastery of skills related to literacy and numeracy, and generally have more positive social and educational outcomes.[14] The analysis on skills as the outcome will be carried out on those aged 25 to 65, while the analysis on labour market outcomes will be limited to the core working-age population (aged 25 to 54).

Literacy and numeracy profile

Among those aged 25 to 65, just over one-third (35%) of off-reserve First Nations people had a literacy score of level 3 or higher, while the figure was 50% for Métis. In comparison, 57% of non-Aboriginal individuals had a literacy score of level 3 or higher (Chart 1). At the same time, almost one-quarter (24%) of off-reserve First Nations people and 40% of Métis had higher levels of numeracy, compared with 49% of their non-Aboriginal counterparts.

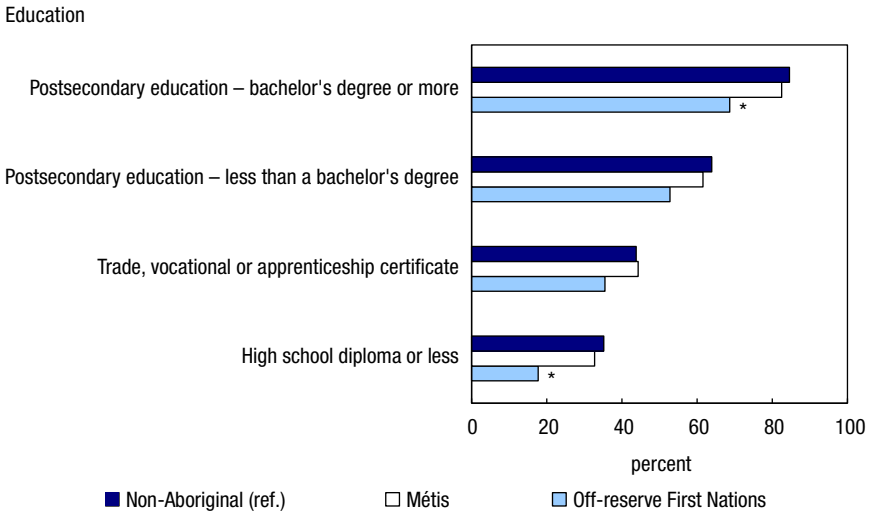
In order to gain a better understanding of the information-processing skills of the Aboriginal population, the relationship between skills and selected sociodemographic characteristics should be examined, particularly the highest level of education. However, the existing

Chart 1
Proportion with higher literacy and numeracy skills (level 3 or higher) among off-reserve First Nations, Métis and non-Aboriginal adults aged 25 to 65, 2012



Source: Statistics Canada, Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

Chart 2
Proportion with higher literacy skills (level 3 or higher) among adults aged 25 to 65, by selected Aboriginal identity group and highest level of education, 2012



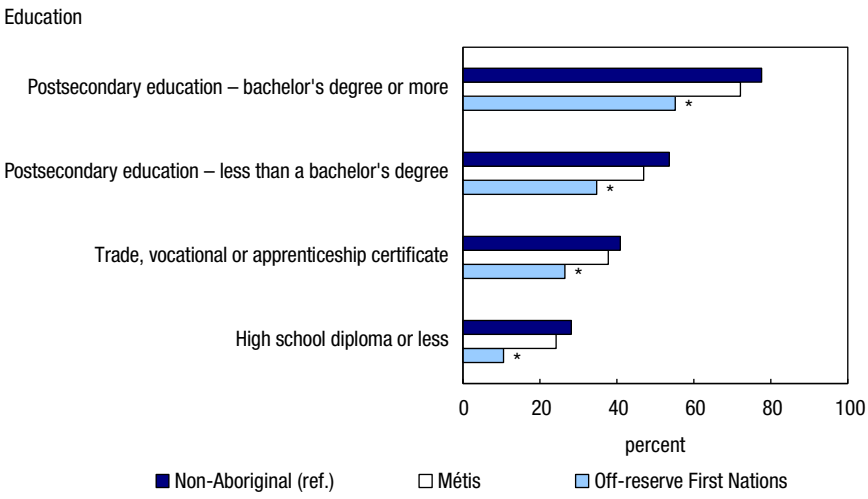
* significantly different from the reference category (ref.) ($p < 0.05$)
Source: Statistics Canada, Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

research on the relationship between skills, competency and educational attainment has focused on the general population;[15] thus less is known about this association among the Aboriginal population.

Using PIAAC, the results show that individuals with higher levels of completed education have greater proportions of higher skill levels (Chart 2). For example, the proportion with higher levels of literacy was 18% for off-reserve First Nations adults aged 25 to 65 with a high school diploma or less as their highest level of education. This proportion increased to 35% for those with a trade/vocational or apprenticeship certificate; 53% for those with a postsecondary qualification of less than a bachelor's degree (but including college diplomas), and 69% for those with a bachelor's degree or more. A similar trend is evident for Métis and non-Aboriginal respondents, except that they had a greater proportion with higher skill levels than their off-reserve First Nations counterparts.

Similar results were found for numeracy. Specifically, among those who had a high school diploma or less, the proportions with at least a level 3 in numeracy were 11% for off-reserve First Nations adults, and 24% and 28%, respectively for Métis and the non-Aboriginal population. Among those with a university degree, the proportions were 55%, 72% and 78%, respectively, for off-reserve First Nations, Métis and non-Aboriginal adults (Chart 3).

Chart 3
Proportion with higher numeracy skills (level 3 or higher) among adults aged 25 to 65, by selected Aboriginal identity group and highest level of education, 2012



* significantly different from the reference category (ref.) ($p < 0.05$)
Source: Statistics Canada, Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

Factors associated with higher levels of literacy and numeracy

This section examines the characteristics associated with higher levels of literacy and numeracy skills separately for off-reserve First Nations, Métis and non-Aboriginal adults aged 25 to 65. A logistic regression was estimated for each of the three groups to assess the impact of many factors at the same time. Results from these models are presented as predicted probabilities and separated into demographic, family and educational characteristics.[16] A probability of 1 should be interpreted as a 100% chance of having higher skill levels, while a probability of 0 indicates a 0% chance.

Overall, no gender differences were observed for high literacy skills (Table 1). In each case, similar proportions of off-reserve First Nations, Métis and non-Aboriginal men and women had a level 3 or higher in literacy. As for numeracy, the proportion of men who had a level 3 or higher was significantly higher than that of women within the non-Aboriginal population.[17]

Existing research has also shown a relationship between skills and age, with average skill levels decreasing with age.[18] In this analysis, no significant variation at the highest skill level (for both literacy and numeracy) was observed across age groups for off-reserve First Nations people and Métis. Within the non-Aboriginal population, however, the proportion of higher-skilled individuals was higher among those aged 35 to 44 (64% for literacy and 53% for numeracy) and lower for the older age group (56% for literacy and 47% for numeracy).[19]

As observed in the previous section, a higher level of completed education is typically associated with higher skill levels. The multivariate results confirmed this relationship. For instance, off-reserve First Nations and Métis adults with a university degree had a greater predicted probability of higher literacy skill levels than those with a high school diploma or less (62% versus 21% for off-reserve First Nations; 79% versus 37% for Métis). Similar results hold for higher numeracy skills.

Another education-related factor associated with skills is whether the respondent was currently enrolled in an educational program. Individuals who are in a program of study generally have higher skill levels as they are using, as well as acquiring, new literacy and numeracy skills on a daily basis.[20] In this study, current enrolment at an educational institution indicates enrolment at any level and does not differentiate between particular levels of education.[21] Results from the models show that, for off-reserve First Nations and non-Aboriginal adults, those currently enrolled in school are significantly more likely to have higher literacy and numeracy skills than those who are not currently in school. However, the difference was not significant among Métis adults.[22]

Parents' education level is strongly associated with that of their children.[23] Parents with a higher level of education are more likely to have children with a higher level of education. At the same time, those parents, through fostering more academic engagement and a stronger connection to the educational system may, in turn, affect the overall skill level (literacy and numeracy) of their children.[24] The relationship between parental

Table 1
Predicted probabilities of having higher literacy and numeracy skills (level 3 or higher) among off-reserve First Nations, Métis and non-Aboriginal adults aged 25 to 65, various socioeconomic characteristics, 2012

	Literacy			Numeracy		
	Off-reserve First Nations	Métis	Non-Aboriginal	Off-reserve First Nations	Métis	Non-Aboriginal
	predicted probability					
Sex						
Men (ref.)	0.349	0.516	0.617	0.257	0.458	0.586
Women	0.343	0.525	0.583	0.160	0.320	0.423*
Age group						
25 to 34	0.338	0.521	0.630	0.184	0.366	0.528
35 to 44 (ref.)	0.404	0.606	0.637	0.211	0.495	0.530
45 to 54	0.333	0.439	0.583*	0.209	0.365	0.494
55 to 65	0.304	0.522	0.556*	0.190	0.303	0.472*
Education						
High school diploma or less (ref.)	0.209	0.368	0.406	0.108	0.251	0.317
Trade, vocational or apprenticeship certificate	0.349	0.483	0.469*	0.214	0.380	0.411*
Postsecondary education – less than a bachelor's degree	0.501*	0.589*	0.634*	0.315*	0.446*	0.533*
Postsecondary education – bachelor's degree or more	0.623*	0.793*	0.824*	0.446*	0.674*	0.749*
Current student						
Yes	0.595*	0.545	0.694*	0.457*	0.473	0.610*
No (ref.)	0.323	0.518	0.593	0.179	0.375	0.497
Parental education						
Both less than a high school diploma	0.291	0.455	0.538*	0.144	0.311	0.440*
At least one has a high school diploma	0.360	0.523	0.614	0.222	0.380	0.512
At least one has postsecondary education – less than a bachelor's degree (ref.)	0.417	0.597	0.633	0.253	0.496	0.542
At least one has a university degree	0.390	0.550	0.628	0.270	0.401	0.541
Number of books in the home at age 16						
25 or less (ref.)	0.287	0.459	0.497	0.151	0.354	0.394
26 to 100	0.339	0.555	0.602*	0.207	0.395	0.520*
More than 100	0.487*	0.552	0.683*	0.302	0.412	0.588*
Province / region of residence						
Atlantic	0.339	0.417	0.547	0.189	0.289	0.422*
Quebec	0.384	0.380	0.552	0.321	0.262	0.500
Ontario	0.432	0.526	0.626	0.192	0.378	0.517
Manitoba	0.302	0.530	0.628	0.185	0.448*	0.522
Saskatchewan (ref.)	0.259	0.367	0.597	0.160	0.268	0.507
Alberta and British Columbia	0.339	0.622*	0.635	0.214	0.467	0.523
Territories	0.173	0.357	0.596	0.093	0.251	0.463
Employment status						
Employed	0.390	0.568*	0.618*	0.246	0.419	0.530*
Not employed (ref.)	0.279	0.359	0.524	0.136	0.278	0.402

* significantly different from the reference category (ref.) ($p < 0.05$)
Note: Predicted probabilities are derived from marginal effects at the mean, based on logistic regressions.
Source: Statistics Canada, Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

education and higher skill levels, however, was only significant among non-Aboriginal adults.

An additional important family background factor relates to the availability of reading material in the home during adolescence. In this case, existing research has found that exposure to different sources of intellectual stimulation while growing up has a positive effect on a person's academic outcomes, and is associated with higher levels of literacy and numeracy skills.[25] In PIAAC, this can be proxied with the estimated number of books in the home when respondents were 16. Specifically, having reading material available in the home can be seen as beneficial for individuals in terms of developing and increasing skills as they transition into adulthood.

Results show that off-reserve First Nations adults who had fewer books in the home (25 or less) at age 16 had a significantly lower probability of being at level 3 or higher for literacy compared with those who had more than 100 books in the home;

however, the differences were not significant for numeracy. Among Métis adults, there was no significant difference in the probability of higher literacy or numeracy skills based on the number of books at home in adolescence. Non-Aboriginal adults who had more than 25 books in the home at age 16 were significantly more likely to have higher skill levels both in terms of literacy and numeracy than those who had 25 books or less.

With respect to province of residence, earlier work on the general Canadian population found that the proportion with the highest literacy and numeracy proficiency skills (level 3 or higher) varied across the provinces and territories.[26] However, when other factors are considered, there appears to be relatively little variation among those with the highest skill levels across provinces. A notable exception was seen in the case of Métis adults living in Alberta and British Columbia, who had significantly higher literacy levels than their counterparts in Saskatchewan.

Lastly, the relationship between employment and skills is complex and is often thought to be reciprocal. On the one hand, a higher level of skills is needed to obtain gainful employment (especially in a knowledge-based economy), yet, on the other hand, the type of job held can also have an impact on the level of skills. For instance, some types of jobs require workers to utilize more skills related to literacy and numeracy, while others do not. And through this increased exposure to opportunities on the job, the level of skills may rise. In this paper, since causal ordering cannot be established due to the cross-sectional nature of the data, employment and skills are treated as outcomes and predictors.[27] The results suggest that being employed is associated with an increased probability of having skills in the higher range for all groups. However, the differences were only significant for Métis (in the literacy model) and non-Aboriginal adults (in both the literacy and numeracy models).

Employment outcomes of adults with higher skill levels

In this section, the relationship between higher skill levels and employment outcomes are examined for off-reserve First Nations, Métis and non-Aboriginal adults aged 25 to 54.[28] Specifically, this section examines the following questions:

(1) Are adults with higher skill levels (proficiency level 3 or higher) in literacy and numeracy more likely to be employed than individuals with lower skill levels?

(2) Does the relationship between a higher skill level and employment operate similarly for each of the groups in the analysis?

(3) Among adults who are employed, are those with higher numeracy and literacy skills more likely to be employed in professional and managerial occupations?

According to PIAAC, non-Aboriginal adults aged 25 to 54 in 2012 had a higher employment rate (87%) than Métis adults (79%) and off-reserve First Nations adults (62%) in the same age group. These employment rates, however, do not consider other important factors such as age, gender, skills and education.

In order to test the relationship between skills and employment, a multivariate analysis was conducted to control for additional factors. Three sets of logistic regression models were used to examine the relationship between a skills-by-Aboriginal identity interaction variable and the probability of employment. Higher skill levels and Aboriginal identity were combined to assess whether having a higher skill level operates similarly on the probability of employment for off-reserve First Nations, Métis and non-Aboriginal adults.

In the first model, only the variable that combines skills and Aboriginal identity was included. In the second model, because of the close connection between education and skills, highest level of education was added. And finally, in the third model, sociodemographic factors related to employment were added, including gender, age, presence of children in the home, conjugal status, province of residence, and severity of a health limitation. Separate models were applied for literacy and numeracy.

Existing research has shown that skills and employment are associated,[29] thus, individuals with higher literacy and numeracy skill levels can be expected to have a higher likelihood of being employed than those with lower skill levels. The multivariate results do show that those with a higher skill level have a higher probability of employment, but that differences remained between groups (Table 2).

For instance, Model 3 for literacy, which controls for all factors, shows that the higher-skilled non-Aboriginal population had the highest probability of employment, at over 90%. The higher-skilled Métis followed with 87%, a rate that was not significantly different from that of the non-Aboriginal population. The higher-skilled First Nations people living off reserve, however, had a significantly lower probability of employment, at 75%.

Table 2
Predicted probability of employment by skill level and selected Aboriginal identity group, adults aged 25 to 54, 2012

	Literacy			Numeracy		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	predicted probability					
Higher skill level (level 3 or higher)						
Off-reserve First Nations	0.708*	0.707*	0.752*	0.750*	0.744*	0.767*
Métis	0.857	0.860	0.869	0.863	0.864	0.861
Non-Aboriginal (ref.)	0.907	0.902	0.912	0.921	0.915	0.921
Lower skill level (level 2 or lower)						
Off-reserve First Nations	0.563*	0.630*	0.699*	0.572*	0.626*	0.697*
Métis	0.718*	0.769*	0.800*	0.735*	0.775*	0.813*
Non-Aboriginal	0.805*	0.836*	0.867*	0.805*	0.831*	0.864*

* significantly different from the reference category (ref.) ($p < 0.05$)
Notes: Predicted probabilities are derived from marginal effects at the mean, based on logistic regressions.
Model 1: Bivariate
Model 2: Controls on education
Model 3: Controls on education, gender, age, presence of children, conjugal status, province of residence and severity of a health limitation
Source: Statistics Canada, Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

Table 3
Predicted probability of being employed in a professional or managerial occupation by skill level and selected Aboriginal identity group, 2012

	Literacy			Numeracy		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	predicted probability					
Higher skill level (level 3 or higher)						
Off-reserve First Nations	0.638	0.660	0.658	0.655	0.678	0.681
Métis	0.583*	0.592	0.588	0.604	0.614	0.611
Non-Aboriginal (ref.)	0.710	0.694	0.698	0.710	0.692	0.699
Lower skill level (level 2 or lower)						
Off-reserve First Nations	0.347*	0.463*	0.462*	0.390*	0.493*	0.486*
Métis	0.354*	0.490*	0.483*	0.376*	0.494*	0.483*
Non-Aboriginal	0.421*	0.535*	0.534*	0.468*	0.567*	0.561*

* significantly different from the reference category (ref.) ($p < 0.05$)
Notes: Predicted probabilities are derived from marginal effects at the mean, based on logistic regressions.
Model 1: Bivariate
Model 2: Controls on education
Model 3: Controls on education, gender, age, presence of children, conjugal status, province of residence and severity of a health limitation
Source: Statistics Canada, Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

In fact, lower-skilled non-Aboriginal adults were 12 percentage points more likely to be employed than the higher-skilled off-reserve First Nations population (87% versus 75%).[30]

These results, however, reflect the probability of any type of employment and do not address the skill level of a job. To examine this factor, similar models can be estimated to determine the probability of being employed in a managerial or professional occupation among those who have a job.[31]

In 2012, 59% of all employed adults (regardless of skill level or population group) aged 25 to 54 in PIAAC were employed in a managerial or professional occupation. However, for those with higher skill levels (either literacy or numeracy), the probability increased to about 71%. Multivariate models can be used to determine which factors are associated with a greater probability of being employed in a professional or managerial occupation for each of the three groups in this analysis.

In both literacy and numeracy models, results indicate that employed individuals with lower skills have a lower probability of being employed in a managerial or professional occupation (Table 3). This result is fairly consistent across all three groups and all three model specifications.

For example, non-Aboriginal workers with higher literacy skills had the highest probability of working in a managerial or professional occupation (70%). Off-reserve First Nations workers and Métis workers with equally high literacy levels had predicted probabilities of 66% and 59%, respectively (as indicated in model 3), and these probabilities were not statistically different from similarly skilled non-Aboriginal workers. Conversely, within the lower-skilled population of workers, the probability to work in a managerial or professional occupation was 46% among First Nations workers, 48% among Métis workers, and 53% among non-Aboriginal workers.

In general, higher-skilled workers are more likely than lower-skilled workers to be employed in managerial or professional occupations. The fact that this relationship seems to operate similarly for off-reserve First Nations and non-Aboriginal adults is important as it suggests that, conditional upon being currently employed, off-reserve First Nations adults experience a similar benefit to having higher skill levels as their non-Aboriginal counterparts.

Conclusion

Skills, such as literacy and numeracy, are essential for successful integration in a knowledge-based economy. Therefore, knowing the pertinent factors associated with the acquisition of higher skill levels is important, especially for groups that may face more challenges in acquiring and utilizing such skills. One such group in Canada is the Aboriginal population, which, in general, has lower levels of completed education and faces greater challenges in the labour market. Past work has drawn a link between skills, education and employment for the non-Aboriginal population, however, less is known about this link among the Aboriginal groups in Canada.

In 2012, just over one-third (35%) of First Nations people living off reserve aged 25 to 65 had a literacy score at level 3 or higher, while the proportions were 50% for Métis and 57% for the non-Aboriginal population. Moreover, almost one-quarter of off-reserve First Nations people had higher levels of numeracy, compared with 40% and 49% for their Métis and non-Aboriginal counterparts, respectively.

With regard to the characteristics associated with higher literacy and numeracy skills, three findings are of particular significance. First and foremost is the impact of highest level of completed education. While skills increase at higher levels of education for all groups, being currently enrolled in an educational program is also an important factor associated with higher skill levels among off-reserve First Nations and non-Aboriginal populations. Another important factor associated with a greater probability of having a higher skill level for off-reserve First Nations adults is whether they had access to a greater number of books in the home at age 16.

The findings in this analysis also highlight the important relationship between higher skill levels and the probability of employment. Generally speaking, adults with higher skill levels aged 25 to 54 have a greater probability of employment. However, lower-skilled non-Aboriginal adults were 12 percentage points more likely to be employed than off-reserve First Nations individuals with higher literacy skill levels (87% versus 75%). Such results suggest that remaining differences in the probability of employment between off-reserve First Nations and non-Aboriginal adults are due to other factors that cannot be observed with survey data, and that more research is needed to understand such differences. Within the employed population, however, highly skilled off-reserve First Nations and Métis workers were as likely to be employed in a managerial or professional occupation as their non-Aboriginal counterparts.

Skill acquisition can be seen as crucial for successful integration into the labour market, and knowing how skills such as literacy and numeracy can be increased among off-reserve First Nations people and Métis as well as the non-Aboriginal population will help policy makers and educators. The results of the current study do not provide definitive answers as to why some groups have greater skills than others since literacy and numeracy proficiency scores reflect a wide range of personal, familial, work and education-related experiences.[32] Nonetheless, the current results reveal the important characteristics associated with higher skill levels as well as the labour market experiences of off-reserve First Nations, Métis and non-Aboriginal adults.

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Data sources, methods and definitions

Data sources

The Programme for the International Assessment of Adult Competencies (PIAAC) is an international collaborative effort between the Organisation for Economic Co-operation and Development (OECD) and numerous other international organizations. Canada is one of 24 countries and sub-national regions that participated in the first round of PIAAC. The survey, which was administered by Statistics Canada from November 2011 to June 2012, was conducted in collaboration with and with support from Employment and Social Development Canada (ESDC), the Council of Ministers of Education, Canada (CMEC) and many other partners, including provincial and territorial ministries and departments responsible for education. PIAAC is a complex survey of the information-processing skills of youth and adults between the ages of 16 and 65. The PIAAC survey is made up of three main parts—a background questionnaire, a direct assessment and a module on the use of skills.

Definitions

Literacy: Respondents are evaluated on their ability to engage with written texts (print-based and digital) and thereby participate in society, achieve goals, and develop their knowledge and potential. This requires accessing, identifying and processing information from a variety of texts that relate to a range of settings.

Numeracy: Respondents are evaluated on their ability to engage with mathematical information in order to manage the mathematical demands of a range of situations in everyday life. This requires understanding mathematical content and ideas (e.g., quantities, numbers, dimensions and relationships), and the representation of that content (e.g., objects, pictures, diagrams and graphs).

Skill proficiency levels: Individuals with a level 3 proficiency or higher are those who scored more than 275 (out of 500) on the literacy and numeracy assessments, and are defined as those who are in the "upper range" for literacy or numeracy. Of note, these proficiency levels "do not represent strict demarcations between abilities but instead describe a set of skills that individuals possess to a greater or lesser degree. This means that individuals scoring at lower levels are not precluded from completing tasks at a higher level – they are simply less likely to complete them than individuals scoring at the higher level." See below for the descriptions of each level.[33]

Data sources, methods and definitions (continued)

	Literacy	Numeracy
5	Tasks may require the respondent to search for and integrate information across multiple dense texts; construct syntheses of similar and contrasting ideas or points of view; or evaluate evidence-based arguments. Application and evaluation of logical and conceptual models of ideas may be required to accomplish tasks. Evaluating reliability of evidentiary sources and selecting key information is frequently a key requirement.	Tasks require the respondent to understand complex representations as well as abstract and formal mathematical and statistical ideas, possibly embedded in complex texts. Respondents may have to integrate multiple types of mathematical information where considerable translation or interpretation is required; draw inferences; develop or work with mathematical arguments or models; and justify, evaluate and critically reflect upon solutions or choices.
4	Tasks may require the respondent to search for and integrate information across multiple dense texts; construct syntheses of similar and contrasting ideas or points of view; or evaluate evidence-based arguments. Complex inferences and application of background knowledge may be needed to perform successfully.	Tasks require the respondent to understand a broad range of mathematical information that may be complex, abstract or embedded in unfamiliar contexts. These tasks involve undertaking multiple steps and choosing relevant problem-solving strategies and processes.
3	Texts are often dense or lengthy, and include continuous, noncontinuous, mixed, or multiple pages of text. Understanding text and rhetorical structures becomes more central to successfully completing tasks, especially navigating complex digital texts. Tasks require the respondent to identify, interpret, or evaluate one or more pieces of information, and often require varying levels of inference.	Tasks require the respondent to understand mathematical information that may be less explicit, embedded in contexts that are not always familiar and represented in more complex ways. Tasks require several steps and may involve the choice of problem-solving strategies and relevant processes.
2	The medium of texts may be digital or printed, and texts may comprise continuous, noncontinuous or mixed types. Tasks in this level require the respondents to make matches between the text and information, and may require paraphrasing or low-level inferences. Some competing pieces of information may be present.	Tasks require the respondent to identify and act on mathematical information and ideas embedded in a range of common contexts where the mathematical content is fairly explicit or visual with relatively few distractors.
1	Most of the tasks require the respondent to read relatively short digital or print continuous, noncontinuous or mixed texts to locate a single piece of information that is identical to, or synonymous with, the information given in the question or directive.	Tasks require the respondent to carry out basic mathematical processes in common, concrete contexts where the mathematical content is explicit with little text and minimal distractors.
< 1	The tasks at this level require the respondent to read brief texts on familiar topics to locate a single piece of specific information. There is seldom any competing information in the text and the requested information is identical in form to information in the question or directive.	Tasks require the respondent to carry out simple processes such as counting, sorting and performing basic arithmetic operations with whole numbers or money, or to recognize common spatial representations in concrete, familiar contexts where the mathematical content is explicit with little or no text or distractors.

Notes

1. See Hanushek et al. (2013); OECD (2013); and Statistics Canada et al. (2013).
2. See OECD (2013).
3. See Statistics Canada et al. (2013).
4. See Park and Kyei (2011); OECD/Statistics Canada (2005); and Statistics Canada et al. (2013).
5. See Statistics Canada (2013a).
6. See Statistics Canada (2013b).
7. See Pendakur and Pendakur (2011); White et al. (2003); and Walters et al. (2004).
8. PIAAC is a complex survey that collected data on the information skills of youth and adults between the ages of 16 and 65 in Canada (excluding reserves) and 23 other countries in 2011 and 2012. Its direct assessment component measures literacy, numeracy and problem solving in technology-rich environments. For more information on PIAAC, see Statistics Canada et al. (2013).
9. However, there are no sections in the survey that capture Aboriginal ways of learning. See Bougie (2008) as an example of other work examining literacy in the Aboriginal population using the 2003 International Adult Literacy and Skills Survey (IALS).
10. For the purposes of this report, First Nations people includes both Status and Non-Status Indians. In addition, in PIAAC, it was possible to report both single and multiple responses to the Aboriginal identity question. The data presented here, however, are based on the population reporting a single identity of either First Nations or Métis.
11. Earlier work using PIAAC made a similar sample exclusion (Hango, 2014).
12. Although PIAAC oversampled Aboriginal people across the country, the number of Inuit respondents is small and many of the estimates would have to be suppressed. In terms of their scores, Inuit adults aged 16 to 65 had an average score of 219 in literacy and 200 in numeracy, compared with 273 and 265 for non-Aboriginal adults. Note, however, that the skills assessment in PIAAC was carried out in either English or French, whereas a majority of Inuit speak Inuktitut. As a result, individuals taking part in PIAAC in their second language may be at a disadvantage (Statistics Canada, 2013c).
13. See Statistics Canada et al. (2013). The PIAAC definition of numeracy is designed to evaluate how mathematical concepts are applied in the real world rather than whether an individual can solve a set of equations in isolation.
14. See Murray et al. (1997); Statistics Canada (2005); and Tuijnman (2001).
15. See Park and Kyei (2011); OECD and Statistics Canada (2005); and Statistics Canada et al. (2013).
16. The equivalent bivariate results are presented in Table A1 of the supplementary information section.
17. This is consistent with existing research on the Canadian population. See Statistics Canada et al. (2013).
18. OECD and Statistics Canada (2005); Statistics Canada et al. (2013).
19. In bivariate models (see Table A1), when no other variables are included in the model, the oldest age groups have significantly lower proportions at the highest skill levels for all groups except for high numeracy among off-reserve First Nations adults where no significant deterioration of skills was observed even at the bivariate level.
20. See Willms and Murray (2007).
21. Additional analysis (not shown) separates current student status by level. In this case, a greater proportion of current students at the bachelor's level are observed to have higher literacy and numeracy than current students in programs below the bachelor's level. However, these estimates must be interpreted in the context of a small sample size for the First Nations and Métis populations.
22. This is likely due to the fact that Métis adults are much more likely to be enrolled in an educational program at a level below bachelor's (9% versus 2% at the bachelor's level or above). Among the off-reserve First Nations and non-Aboriginal populations, attendance in programs above or below bachelor's degrees were more or less equally distributed, around 4% or 5% each.
23. See Kaushal (2014); and Turcotte (2011).
24. See Ho Sui-Chu and Willms (1996); and Yan and Lin (2005).
25. See DeGraaf et al. (2000), Hango (2014); Jaeger (2011); and Sullivan (2001).

26. See Statistics Canada et al. (2013).

27. The employment measure used in this paper is defined as the population that is currently employed in a job (equal to 1, while that for the unemployed and inactive is equal to 0).

28. In this case, the focus is on the core working-age population (aged 25 to 54) because individuals in this age range are most active in the labour market, which may offer better comparisons across groups. See Luffman (2006) as an example of other recent work using the core working-age population.

29. See Hanushek et al. (2013); and Green and Riddell (2001).

30. This difference was significant at the 5% level.

31. Managerial and professional occupations are defined using the International Standard Classification of Occupations (ISCO codes 11 to 35), which "group occupations based on the nature of the job and the required skill level, where a job is defined as the set of tasks and duties to be performed, and skills are defined as the abilities to carry them out" (Statistics Canada et al., 2013, p. 38). In the ISCO, managers "plan, direct, coordinate and evaluate the overall activities of enterprises, governments, and other organizations or of organizational units within them, and formulate and review their policies, laws, rules and regulations". Although the skills required from management jobs may vary, they were regrouped with professional occupations in the analysis. However, similar results were found when the models were performed on professional occupations only. Moreover, the weekly use of numeracy and literacy skills at work was similar for managers and professionals, and was clearly higher than in other occupational categories in both cases.

32. One important variable—size of community of residence (from rural areas to large population centres of 100,000 plus)—was included in some analyses, but did not have any significant direct impact on the skills model, or the employment probability model. As a result, it was not included in the results presented in this study.

33. See Statistics Canada et al. (2013) for additional details.

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Supplementary information

Table A1
Proportion with higher literacy and numeracy skills (level 3 or higher) among off-reserve First Nations, Métis, and non-Aboriginal adults aged 25 to 65, various socioeconomic characteristics (bivariate results), 2012

	Literacy			Numeracy		
	Off-reserve First Nations	Métis	Non-Aboriginal	Off-reserve First Nations	Métis	Non-Aboriginal
	proportion					
Sex						
Men	0.342	0.484	0.569	0.281	0.435	0.548
Women	0.361	0.517	0.563	0.213	0.362	0.437
Education						
High school diploma or less	0.177	0.327	0.352	0.105	0.242	0.281
Trade, vocational or apprenticeship certificate	0.355	0.443	0.438	0.265	0.378	0.409
Postsecondary education – less than a bachelor's degree	0.528	0.615	0.639	0.347	0.469	0.536
Postsecondary education – bachelor's degree or more	0.687	0.825	0.846	0.552	0.721	0.776
Current student						
Yes	0.583	0.601	0.750	0.479	0.538	0.675
No	0.330	0.490	0.552	0.219	0.382	0.480
Parental education						
Both less than high school	0.253	0.377	0.388	0.142	0.268	0.320
At least one high school diploma	0.376	0.496	0.574	0.267	0.387	0.494
At least one postsecondary certificate or diploma – less than a bachelor's degree	0.510	0.659	0.649	0.371	0.566	0.572
At least one university degree	0.531	0.644	0.758	0.410	0.532	0.687
Number of books in the home at age 16						
25 or less	0.238	0.370	0.384	0.138	0.287	0.318
26 to 100	0.388	0.558	0.574	0.281	0.426	0.504
More than 100	0.558	0.603	0.729	0.416	0.508	0.646
Age group						
25 to 34	0.367	0.578	0.663	0.257	0.461	0.587
35 to 44	0.452	0.612	0.642	0.295	0.517	0.561
45 to 54	0.330	0.395	0.534	0.235	0.336	0.466
55 to 65	0.243	0.405	0.440	0.170	0.248	0.373
Province / region of residence						
Atlantic	0.332	0.381	0.477	0.222	0.284	0.384
Quebec	0.402	0.303	0.482	0.377	0.228	0.446
Ontario	0.460	0.541	0.617	0.274	0.425	0.528
Manitoba	0.270	0.499	0.591	0.183	0.436	0.510
Saskatchewan	0.255	0.359	0.554	0.175	0.283	0.490
Alberta and British Columbia	0.343	0.601	0.623	0.248	0.473	0.539
Territories	0.171	0.352	0.642	0.111	0.273	0.538
Employment status						
Employed	0.417	0.557	0.606	0.302	0.446	0.538
Not employed	0.258	0.321	0.405	0.153	0.245	0.310

Note: Standard errors and coefficients of variation are available upon request.
Source: Statistics Canada, Programme for the International Assessment of Adult Competencies (PIAAC), 2012.