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Intelligence MEMOS

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From: Lucia Tramonte and Herbert Emery

To: Provincial Ministries of Education

Re: KNOWLEDGE ECONOMY, WITH LITTLE KNOWLEDGE: CANADA'S DISMAL MATH SCORES

Strong numeracy skills are essential for Canada to remain globally competitive, build a knowledge economy and ensure its youth can fully participate in society.

Yet for about two decades, Canadian 15-year-olds' mathematics **skills**, as measured by the OECD's Programme for International Student Assessment (PISA), have **declined** in every province. As our aspirations for a knowledge economy went higher, our educational outcomes sank steadily lower.

For years, Canadian **politicians** and **economists** have **promised** a "knowledge economy" future. In the 2000s, **Tom Courchene** and many others argued that Canada's prosperity would come from transitioning to a knowledge economy requiring a higher human capital workforce. Recent federal budget speeches highlight the need to invest in skills and training that workers will need for the "good-paying jobs of tomorrow," and now, Ottawa's "AI for All" strategy has set a goal of 250,000 AI-related jobs.

Despite all of that, Canadian youth showed no advance in these skills and for most, the skills declined.

Between 2009 and 2025, across all provinces, PISA mathematics performance deteriorated and the deterioration was concentrated at the bottom of the distribution. The decline was roughly three times worse for the weakest students than for the strongest.

To put these changes in perspective, about 20 points on the PISA scale is equivalent to roughly one year of learning. Our analysis of publicly available PISA data for Canada from 2009, 2012, 2015, 2018, 2022 and 2025 is represented in Figure 1, and shows the stark decline: The weakest students, at the 10th percentile, lost about 2.5 years of learning; at the median, 2.0; the strongest, at the 90th percentile, 1.1. The decline was therefore roughly three times larger for the weakest students than for the strongest, and the distance between 10th percentile and 90th percentile widened by about a year and a half of learning.

The decline at the bottom of the distribution is alarming because it points to a growing number of youth entering adulthood with weak numeracy skills and greater economic vulnerability. But the losses extend beyond the weakest students, showing another important socio-economic cost for provinces.

Fewer students are now reaching the higher levels of mathematical proficiency that can help prepare them for post-secondary STEM pathways. Expressing each percentile's distance from that line in years of learning answers a concrete question: how much of the age cohort is still within reach of a STEM program, and how far the rest would have to travel to get there.

STEM readiness – which we define as scoring at a minimum 544.7 points in the mathematics PISA test or being proficient at least at Level 4 – has moved from a near-majority standard for Canadian 15-year-olds in 2009 to one met by only one-quarter of 15-year-olds in 2025. The share of 15-year-olds meeting this STEM-readiness threshold dropped sharply between 2009 and 2025. Across provinces, it declined from between 26 percent and 52 percent in 2009 to between 16 percent and 34 percent in 2025. New Brunswick had the smallest share of STEM-ready youth at 15.8 percent in 2025, down from 27.1 percent in 2009. Quebec retains the largest share of its youth STEM-ready, 33.9 percent, but is down from 51.7 percent in 2009. By 2025, no province has a median student performing at Level 4, and the decline in the median proficiency ranges from 2.1 years of learning in Quebec to a disastrous 4.8 years in New Brunswick.

This deterioration has consequences for Canada's future talent pipeline. If the difference between the share of 15-year-olds reaching Level 4 or higher in 2009 and 2025 is applied to the 2025 population of 15-year-olds, the results imply that about 66,000 fewer young people per year are ready for post-secondary STEM study. This represents an enormous loss of potential human capital at a time when Canada needs more, not fewer, young people prepared to pursue STEM education and careers. For perspective, about 170,000 domestic students entered the first year of a university bachelor's program in Canada in 2023/24.

Canadian provinces spend heavily on education in a system that is highly decentralized in administration and curriculum, and remarkably weak in accountability for outcomes.

It would be one thing if provincial governments recognized the problem but were struggling to fix it. They have the data, but we wonder whether they are even aware of the growing social and economic costs of declining, but reversible, educational outcomes.

See Figure 1 on the next page.

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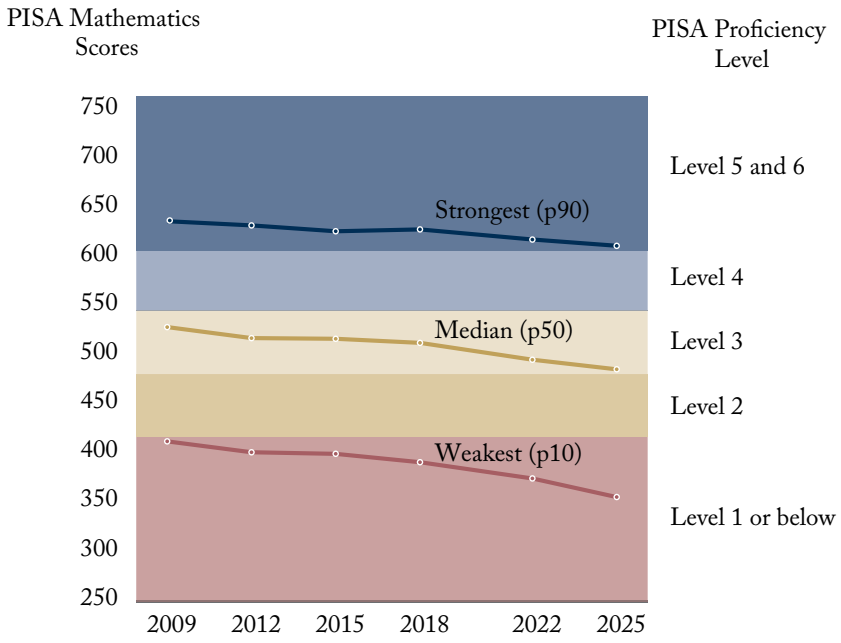
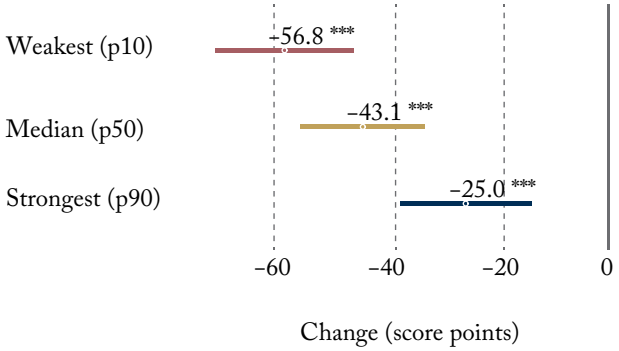
Figure 1: Trends in Percentiles of PISA Distribution of Mathematics Scores in Canada (2009-2025)

Panel 1: Mathematics PISA Test Score by Percentile, 2009-2025



Panel 2: Change in PISA Scores by Percentile, 2009-2025



Notes: Panel 1 tracks math scores for Canada's weakest, median or typical, and strongest 15-year-olds from 2009 to 2025. Colour bands show PISA mathematics proficiency levels. Red represents Level 1 or below, where mathematics proficiency is too weak to support full participation in the labour market and society – the zone of what we can call functional innumeracy. Orange represents Level 2, or basic numeracy – the minimum standard set by the UN's Sustainable Development Goals (SDG4). Students should perform at least at Level 3 (pale yellow) to successfully pursue post-secondary education. Levels 4, 5 and 6 (two shades of blue) represent the proficiency levels needed to pursue and complete post-secondary education and careers in STEM (science, technology, engineering, and math) – including the kinds of jobs, such as management roles and occupations that typically require a university degree, that tend to offer the most stability and highest pay.
Panel 2 shows the total change in scores since 2009 for each group. The dot marks the size of the change; the bar around it shows the range within which the true change most likely falls. Comparing scores across different test years carries a bit more statistical uncertainty than comparing results within a single year, and this extra uncertainty is factored into the bars shown. Stars indicate significance level: *** p<.001, ** p<.01, * p<.05.
The national 2009 figure also includes about 3,800 students who were not assigned to a specific province, so it is not simply the average of the ten provincial results.

Source: Authors' calculation using data from PISA 2009, 2012, 2015, 2018, 2022 and 2025.