

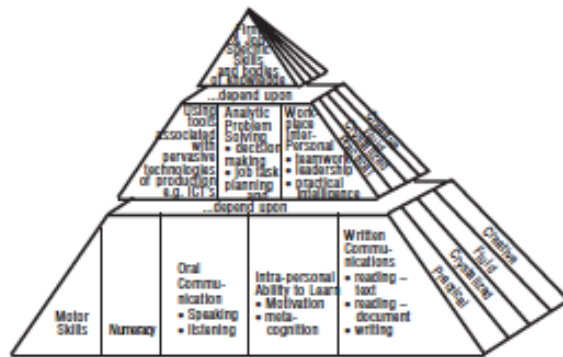
# **Skill supply, skill demand, market function and implications for policy**

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# Skills defined:

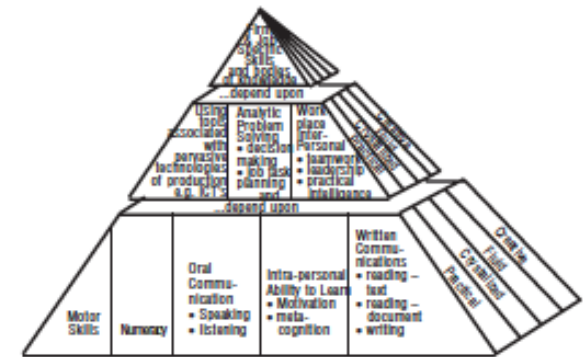
- Technical skills and knowledge however learned
- Cognitive skills needed to apply technical skills and knowledge in non-routine ways i.e, fluid problem solving
- Attitudes and beliefs and institutional structures that support skill acquisition and application including soft skills

# A Framework for thinking About Essential Skill: Profiles of Skill Supply and Demand



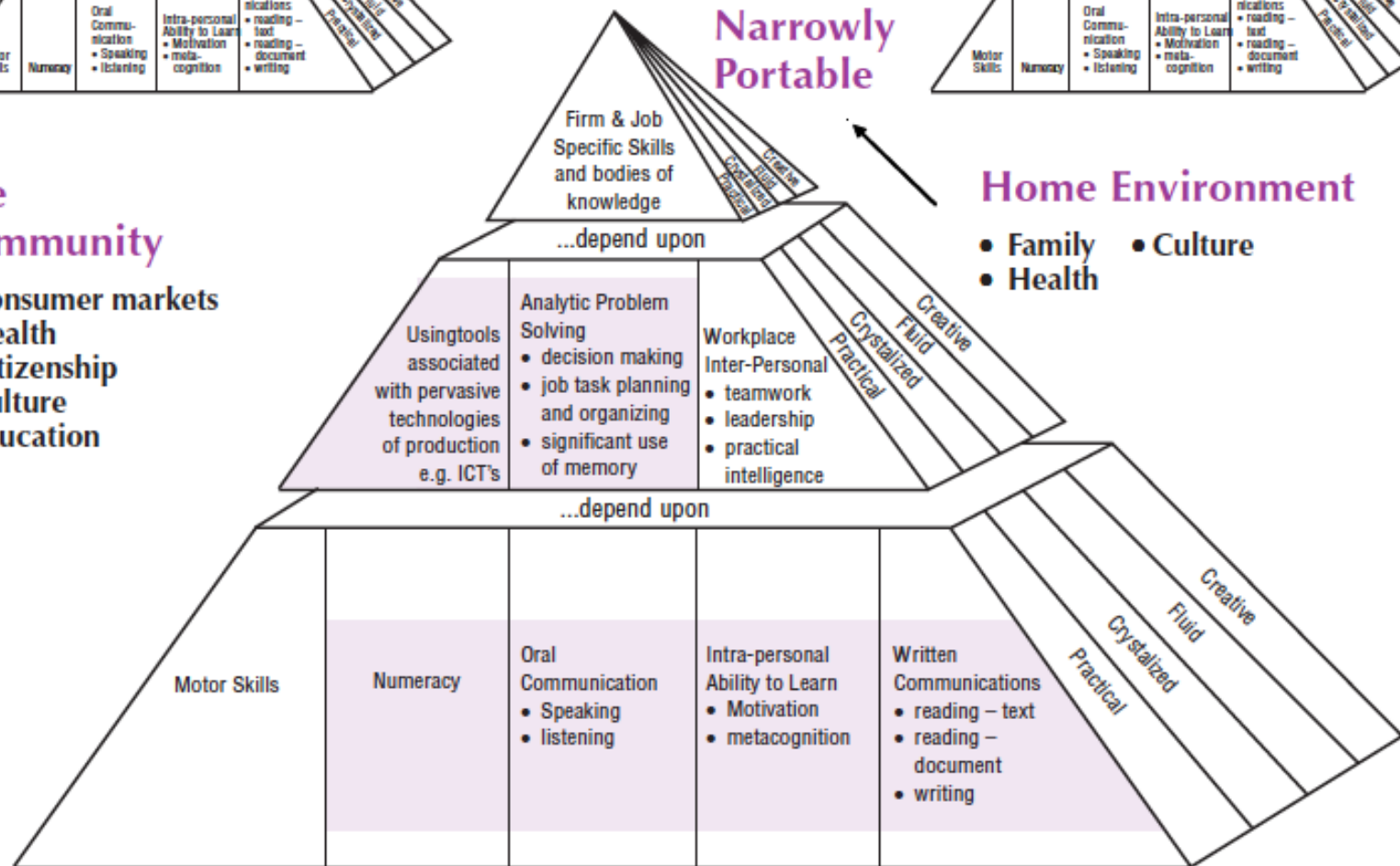
## The Community

- Consumer markets
- Health
- Citizenship
- Culture
- Education



## Home Environment

- Family
- Culture
- Health



## The World of Work

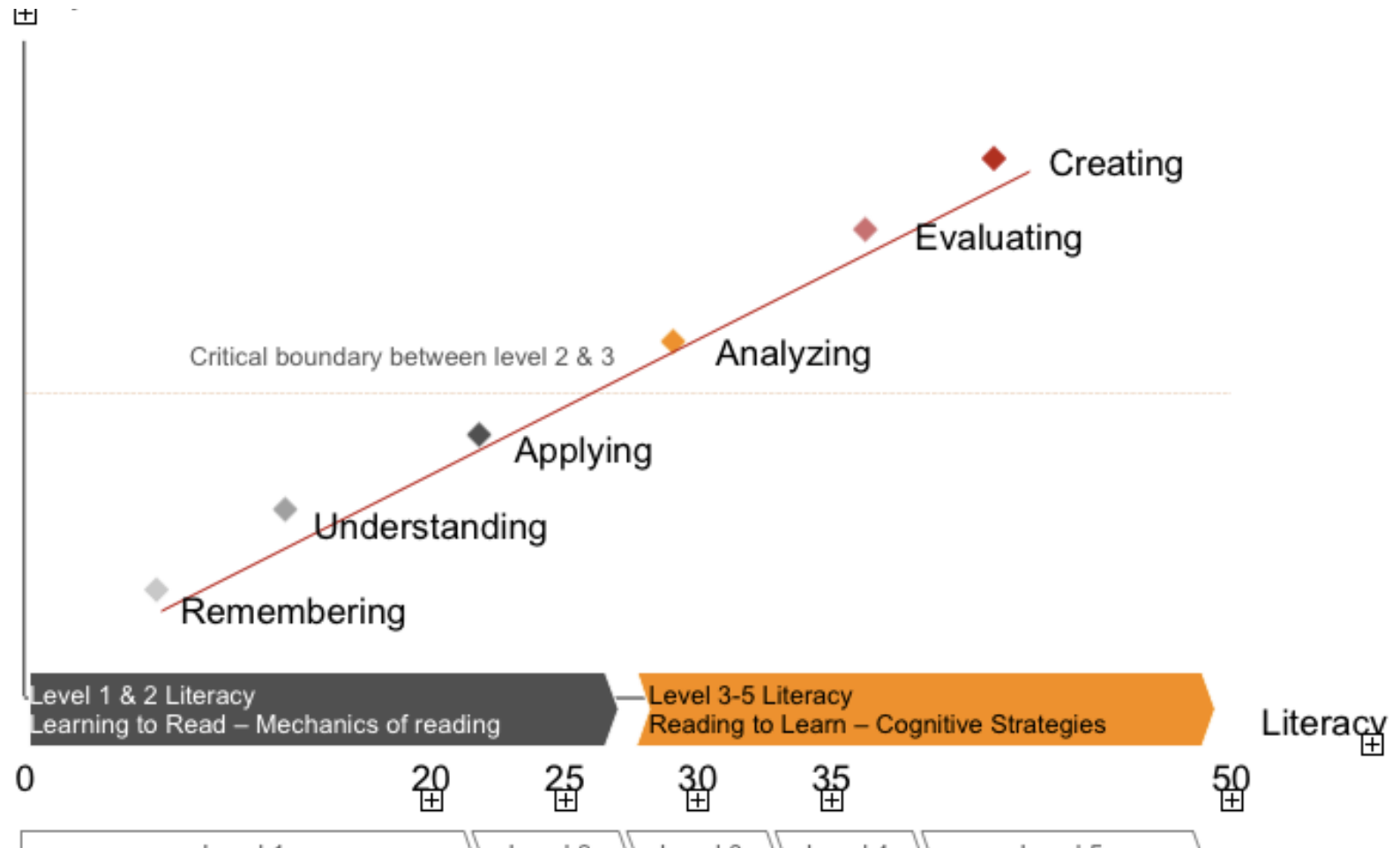
# Key insights:

- Adequacy of skill supply can only be judged relative to demand
- There is a hierarchy of skill acquisition and application
- The markets that match supply and demand are responsible for creating skill-based inequalities in outcomes for individuals, social institutions and economies
- The markets that match skill supply and demand are imperfect

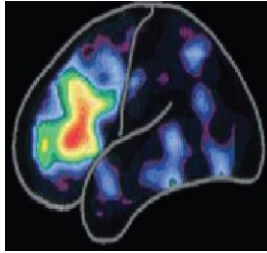
# Key cognitive skills:

- Language (speaking and listening)
- Prose literacy (connected discourse)
- Document literacy (using documents)
- Numeracy (apply mathematics to problems)
- Problem solving (strategy to define problem, identify possible solutions, chose solution, evaluate solutions)

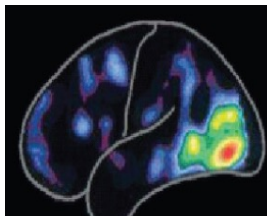
# The relationship of literacy skill to the hierarchy of task difficulty: Level 3 is key



**Level 2 literacy supports the routine application of procedural knowledge, Level 3 supports non-routine problem solving**



**The critical boundary  
between Level 2 and 3**



# **Setting the context: The global economy is in a state of profound change**

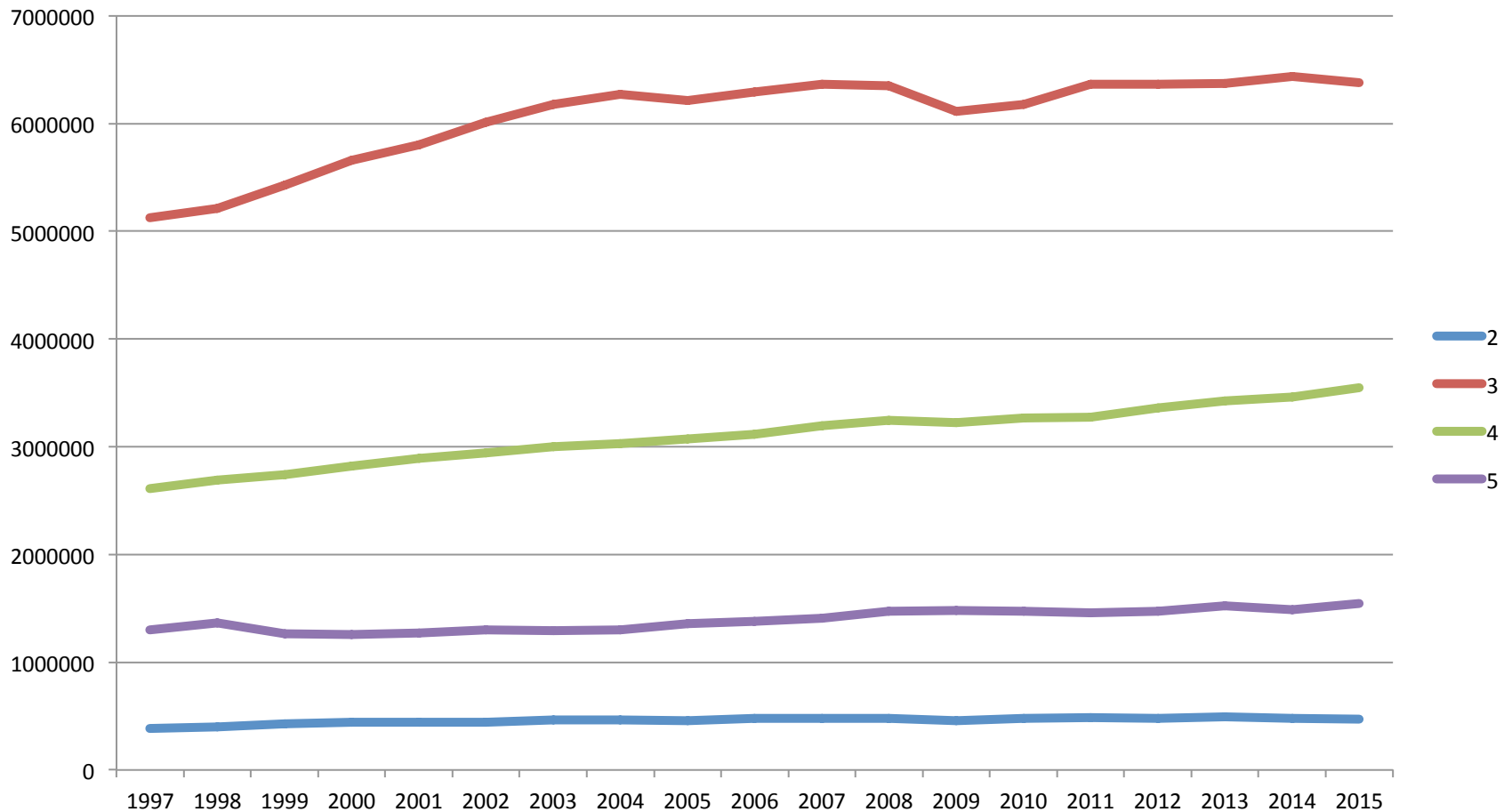
- Automation is displacing jobs that only require the routine application of procedural knowledge
- The globalization of markets for key inputs – capital, raw materials, advanced production technology and R&D – has reduced cost differences among producers
- The rapid increase in global supply of cognitive skills is constraining the growth in real wages in jobs that only demand the application of routine procedural knowledge and driving rapid increases in the number of jobs requiring fluid problem solving
- Trade agreements are reducing barriers to market entry and increasing competition



## **These changes are placing employers under pressure:**

- Employers are under intense pressure to reduce prices for their products and the cost of producing them
- Some employers are adopting a high skill/high wage/high productivity strategy
- Other employers are adopting a low wage/low skill/low productivity strategy to reduce labour costs. This involves reducing the cognitive demands of their jobs, a strategy has been shown to precipitate massive loss of key cognitive skills

**In Canada, the labour market has responded by rapidly increasing the level of literacy proficiency demanded: 94% of all jobs created since 1997 require Level 3 or above**

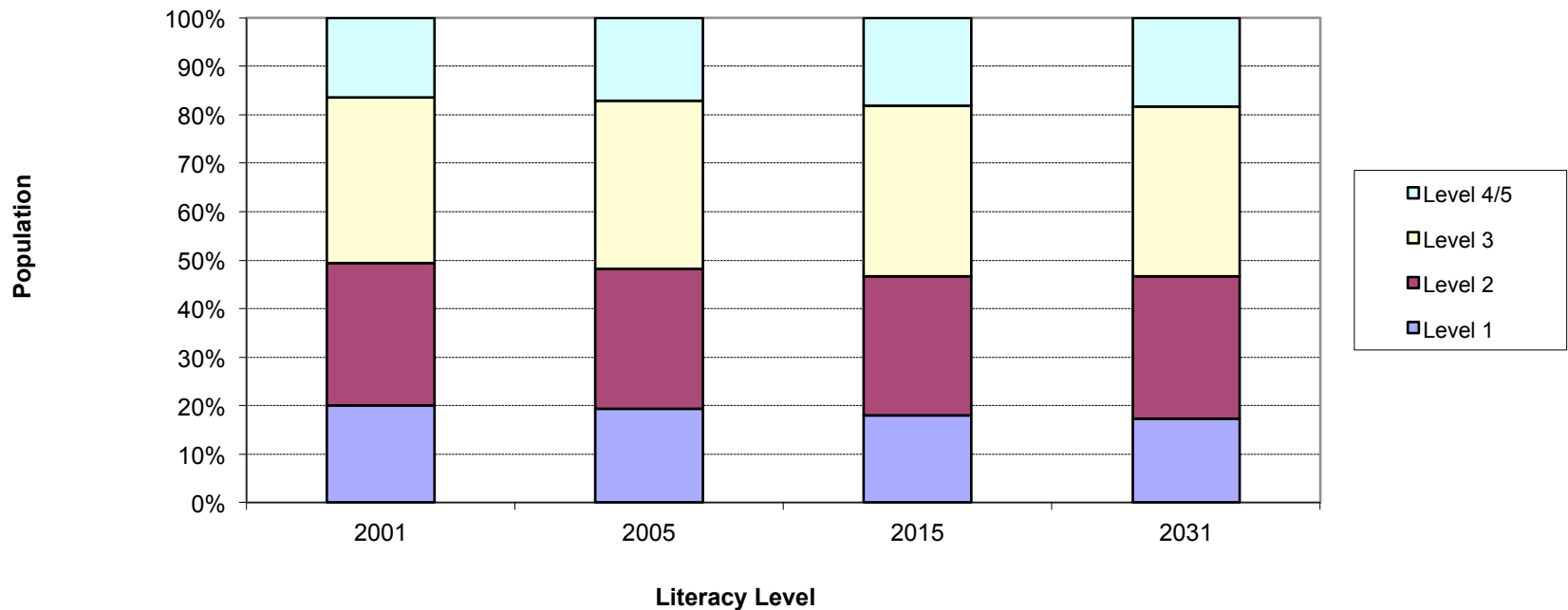


# The current policy response in Canada:

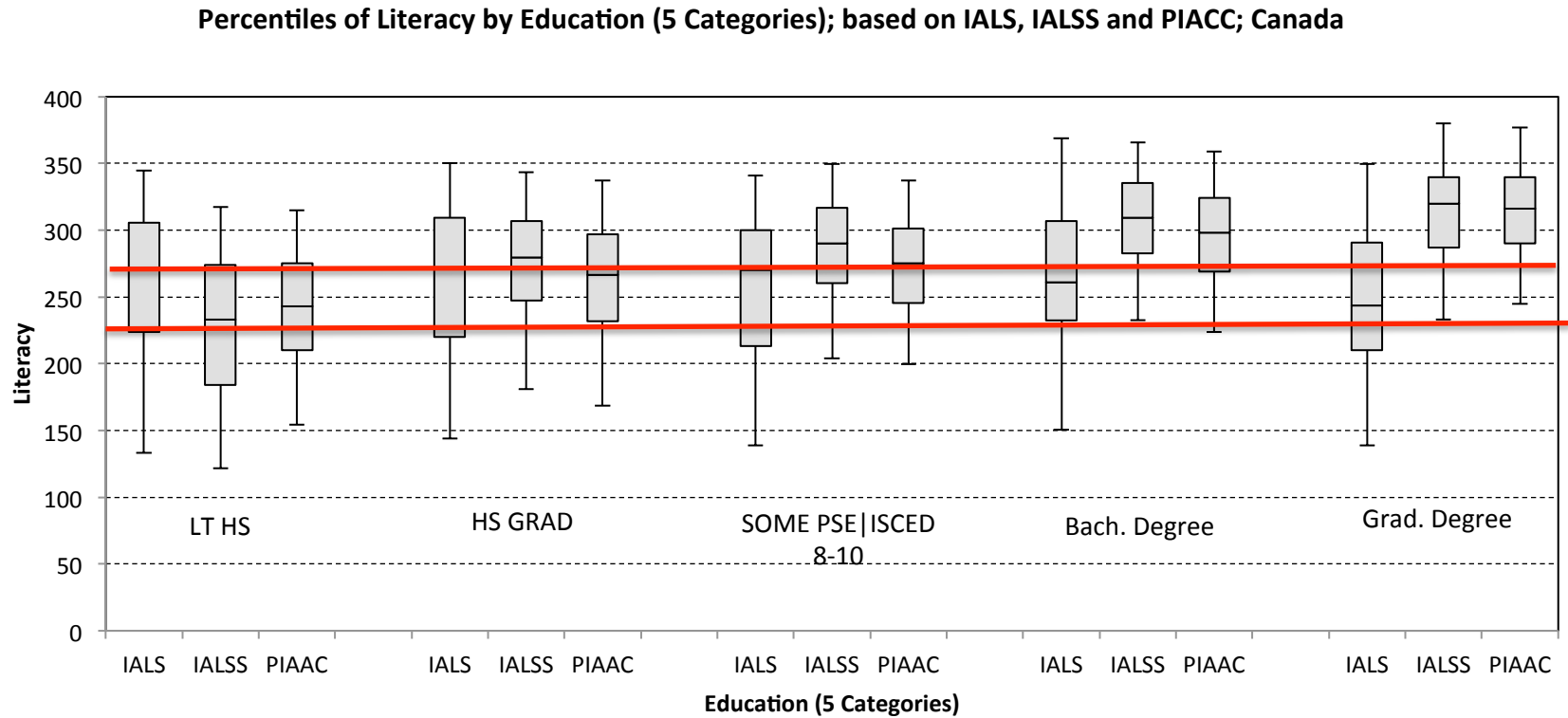
- Canada, as with many countries, is investing heavily in increasing the quantity and quality of initial education. Investments in post-secondary education are particularly high in Canada with 85% of current youth cohort going on to some form of post-secondary study.
- Relatively less attention has been paid to upgrading the literacy skills of adults despite the presence of large occupational literacy skill shortages

# Projections of literacy skill distributions for 2012 – 2025: Stable proportions of adults with literacy Levels 1 and 2 despite rapidly rising education levels

Population Projections - Population at various Literacy Levels Province (All) - Immigration (All)  
- Age Group (All) - Education Level (All)



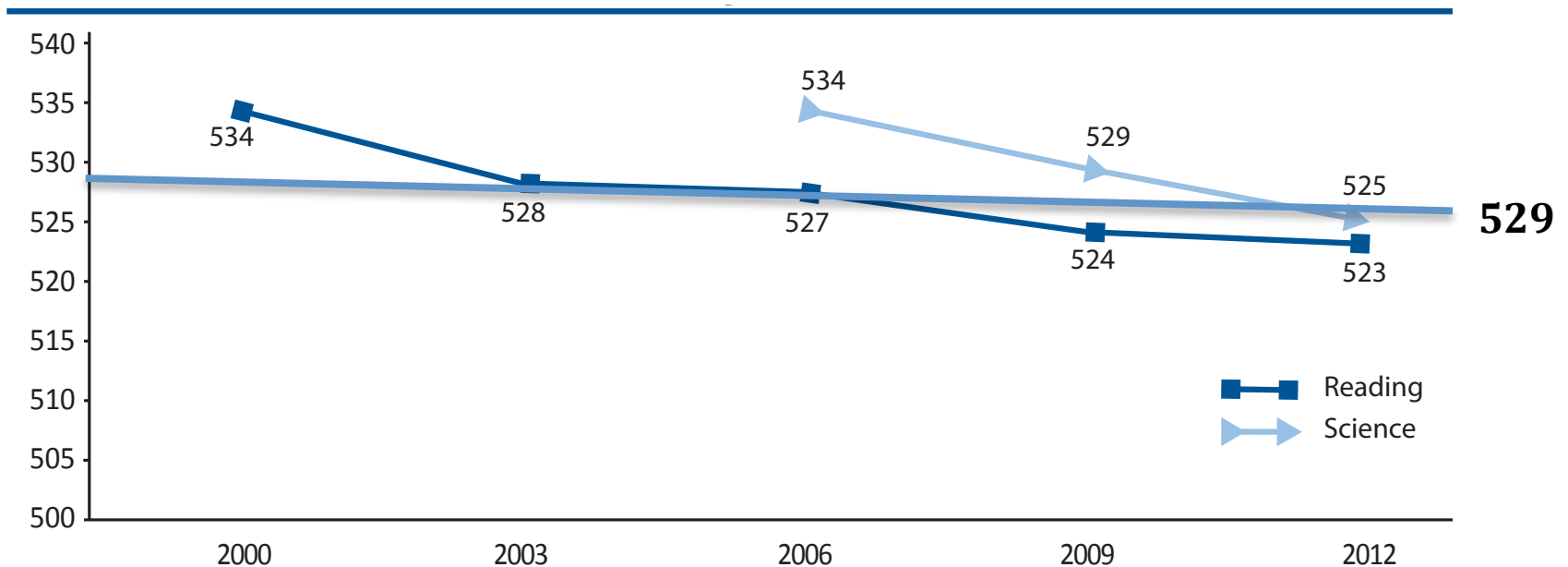
# The PIAAC shock: Literacy scores, expected to rise 25 points on average actually fell 7 points



Values shown are P5, Q1, Median, Q3 and P95

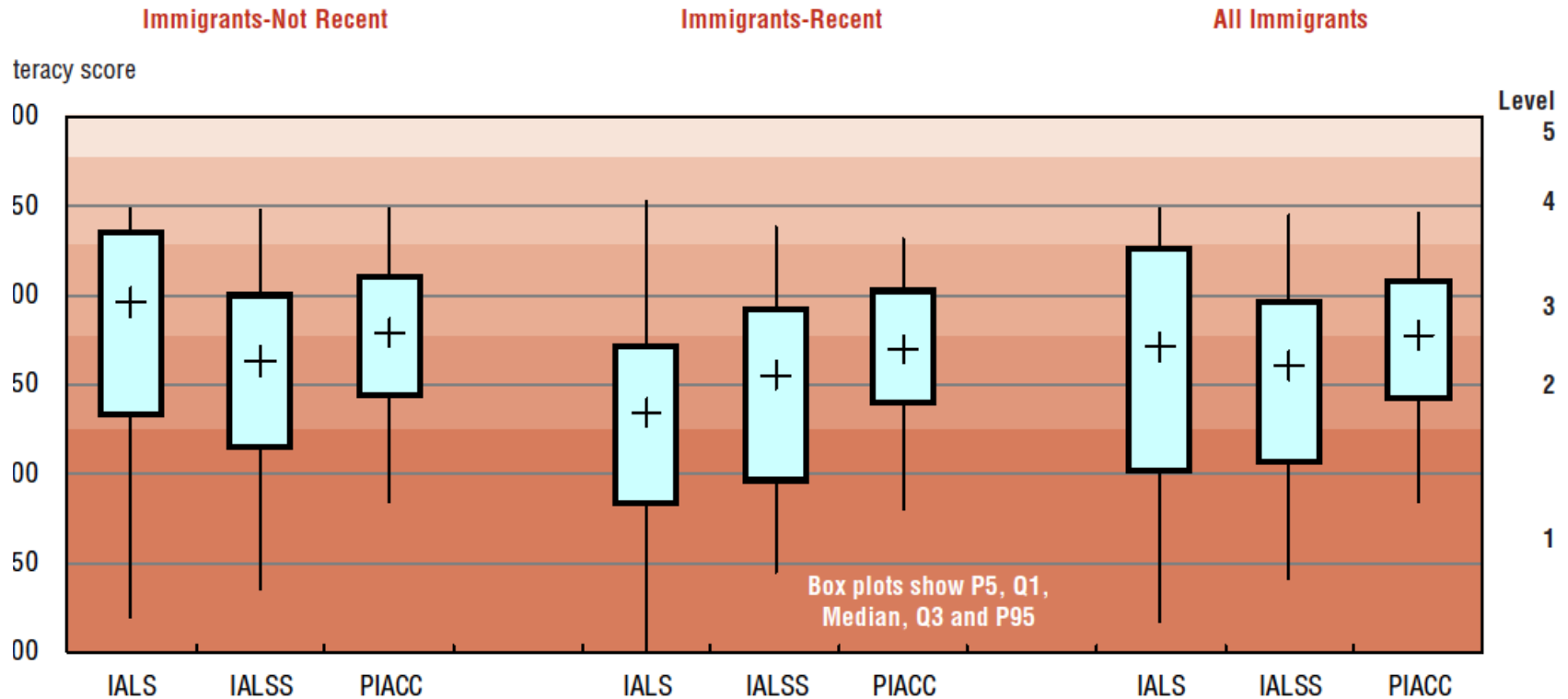
# The search for blame: Falling quality in the K-12 system

**Figure 4.2 Trends in average PISA reading and science scores, students aged 15, 2000 – 2102, Canada**



Source: CMEC (2014) Measuring up: Canadian Results of the OECD PISA Study: 2012 First Results for Canadians Aged 15, Toronto.

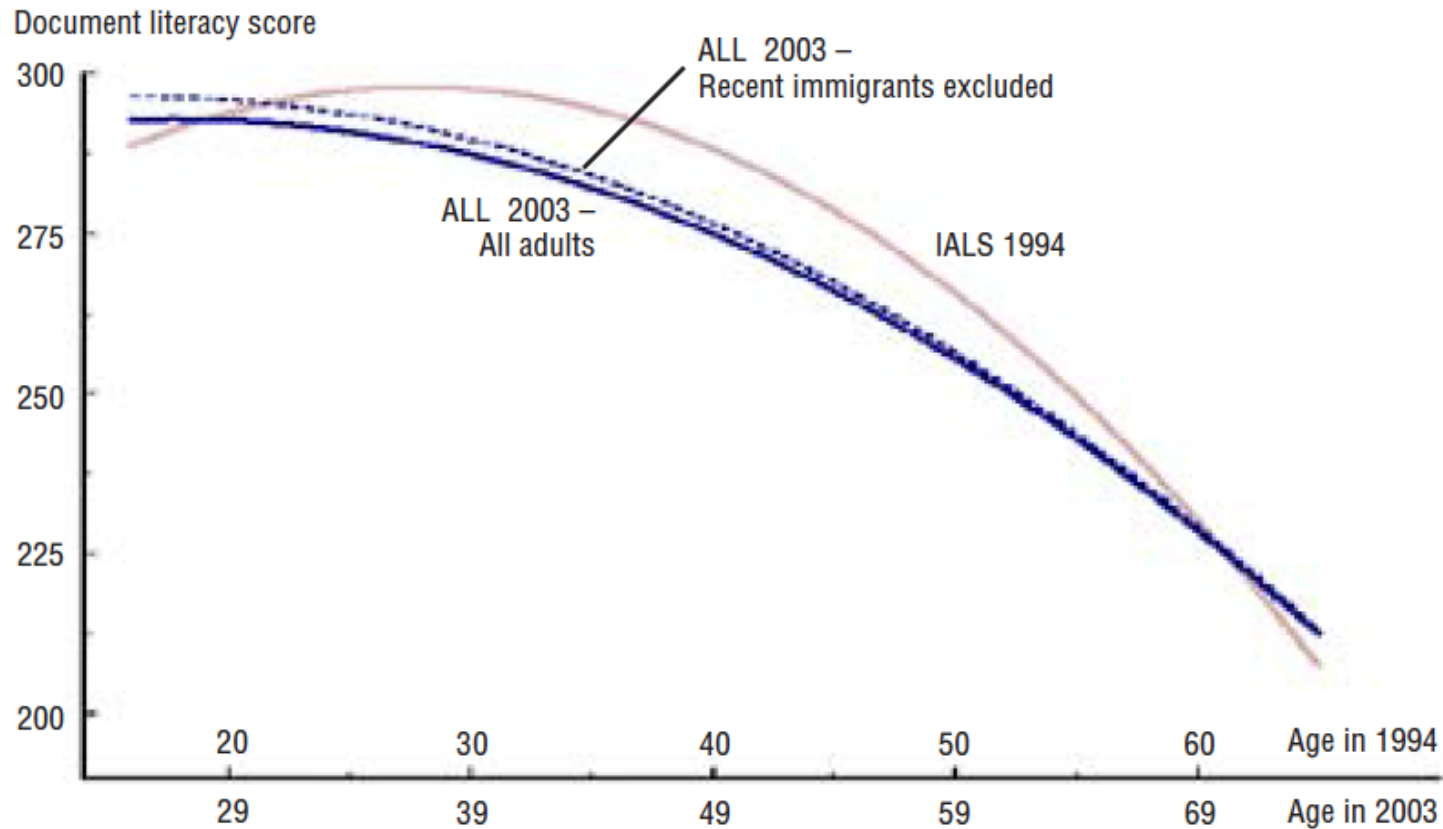
# The search for blame: Those damn immigrants



Source: IALS 1994, IALSS, 2003 and PIAAC 2011.

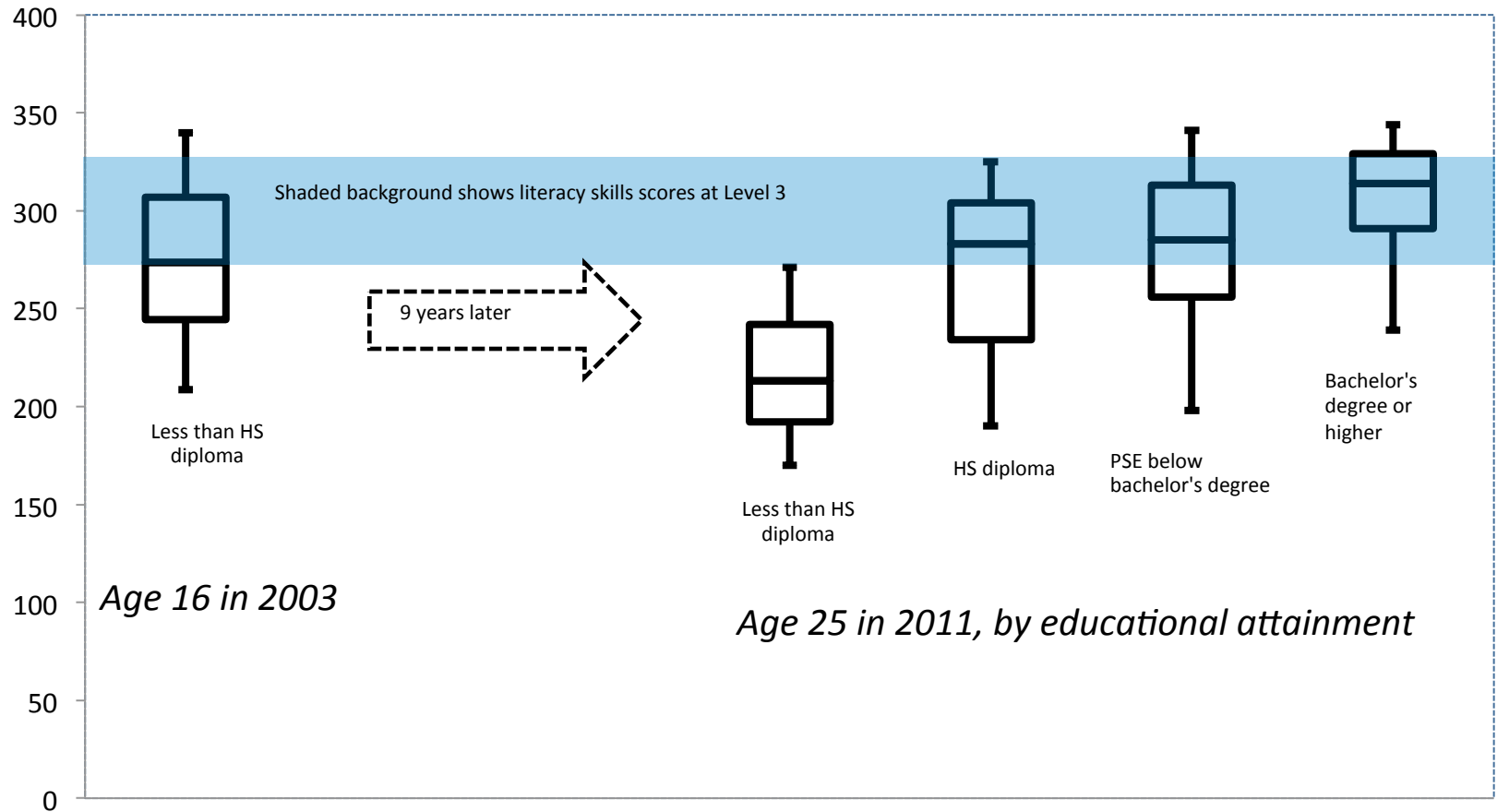
# Search for blame: Skill loss in adulthood

Document literacy scores versus age for Canada, 1994 and 2003





# A significant proportion of youth lose skill after the age of 16



## Average skill gain (loss) in points 2003 – 2011 by education level, Canada

	Change in Literacy 2003 - 2011			
	Age Groups in 2011			
	26-35	36-45	46-55	56-65
Total	(2)	(8)	(12)	(13)
LT HS ISCED 1-3	(56)	(58)	(59)	(47)
HS GRAD ISCED 4-7,15	(13)	(16)	(22)	(18)
Some PSE ISCED 8-10	(7)	(7)	(10)	(17)
Total				
Less than high school diploma	(34)	(21)	(20)	(12)
High school diploma	(15)	(13)	(17)	(12)
Post-secondary education-below bachelors de	(11)	(13)	(14)	(25)
Post-secondary education-bachelors degree or	(4)	(4)	(10)	(11)
Total	(2)	(8)	(12)	(13)

## Skill loss impacts women and Canadian born

Total

Men	2	(10)	(10)	(9)
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Women	(6)	(6)	(14)	(16)
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Total

Canadian born	(3)	(12)	(13)	(16)
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Immigrants	5	(0)	(8)	(2)
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# The lost skill represents a material loss of earnings per year:

Multiple by \$61 per Capita

Age Groups in 2011

	26-35	36-45	46-55	56-65
Less than high school diploma				
High school diploma	\$ (892)	\$ (814)	\$ (1,021)	\$ (753)
Post-secondary education-below	\$ (694)	\$ (774)	\$ (869)	\$ (1,552)
Post-secondary education-back	\$ (247)	\$ (261)	\$ (617)	\$ (686)
Total	\$ (122)	\$ (479)	\$ (719)	\$ (775)

## **The lost skill represents a material loss of earnings per year:**

<b>Multiple by \$61 per Capita</b>	<b>26-35</b>	<b>36-45</b>	<b>46-55</b>	<b>56-65</b>
Men	\$ 119	\$ (588)	\$ (593)	\$ (542)
Women	\$ (375)	\$ (367)	\$ (843)	\$ (1,002)
Canadian born	\$ (173)	\$ (712)	\$ (783)	\$ (975)
Immigrants	\$ 286	\$ (16)	\$ (498)	\$ (151)

# The aggregate loss of earning power is large (\$9.2 Billion per year) and highest among college graduates (\$6.4 billion per year)

## Age Groups in 2011

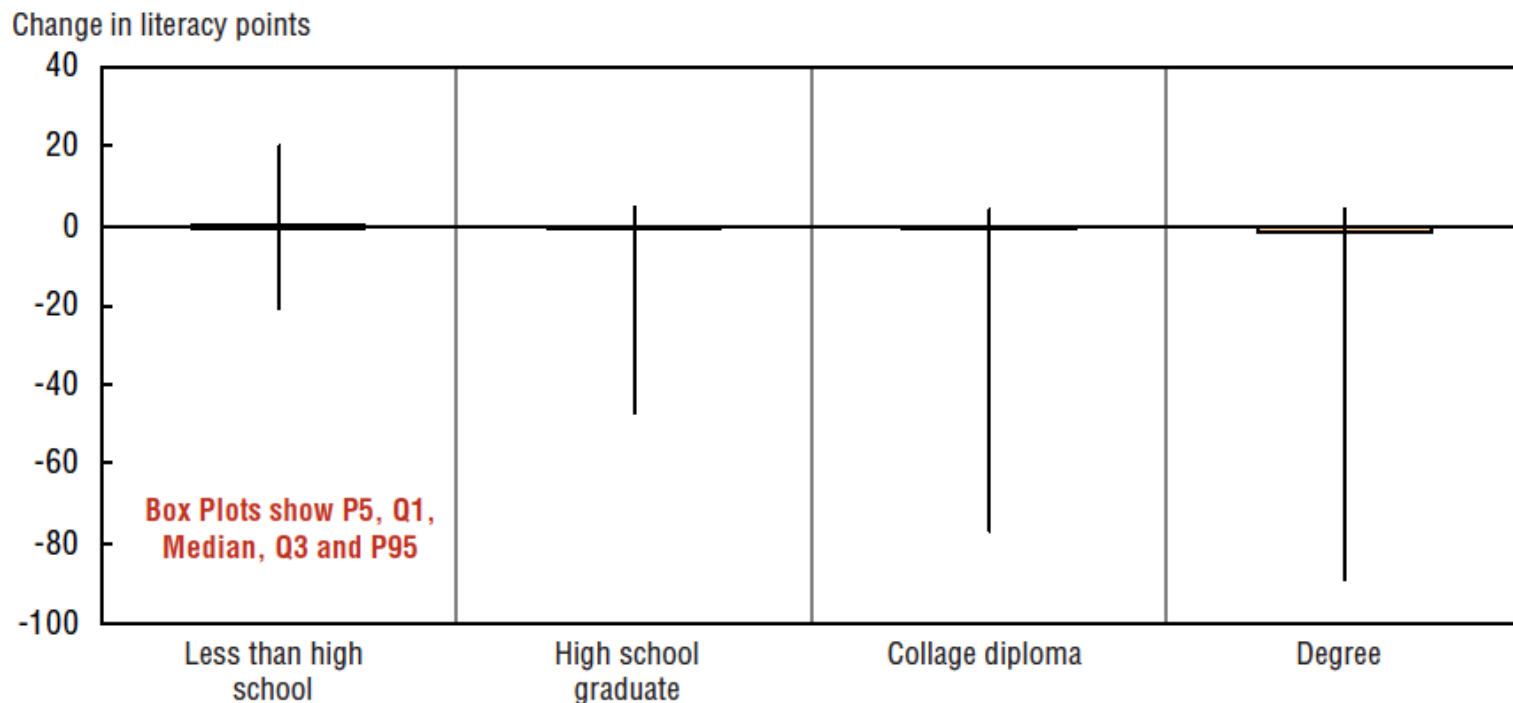
	26-35	36-45	26-35	36-45	
High school diploma	\$ (1,456)	\$ (684)	\$ (789)	\$ (802)	(3,731)
Post-secondary education-below bachelors degree	\$ (542)	\$ (1,226)	\$ (1,426)	\$ (3,196)	(6,390)
Post-secondary education-bachelors degree or higher	\$ (77)	\$ (338)	\$ (804)	\$ (794)	(2,014)
Total	\$ (474)	\$ (1,924)	\$ (2,928)	\$ (3,822)	(9,148)

**Women and Canadian born bear a disproportionate share of the aggregate loss of earnings potential: \$5.6 and \$9.3 billion**

	26-35	36-45	26-35	36-45	
Men	\$ 239	\$ (1,210)	\$ (1,212)	\$ (1,327)	(3,510)
Women	\$ (708)	\$ (721)	\$ (1,706)	\$ (2,484)	(5,618)
Canadian born	\$ (616)	\$ (2,432)	\$ (2,503)	\$ (3,767)	(9,317)
Immigrants	\$ 96	\$ (10)	\$ (435)	\$ (161)	(509)

# Two synthetic cohort analyses: aged cross-sectional averages and linked individuals on the 2003 and 2011 micro files that allow one to reconstruct the full distribution of skill gain and loss

**Figure 3.24A Average skill gain/loss, 2003-2011, educational attainment, adults aged 16 to 65, Canada**



Source: IALSS. 2003 and PIAAC 2011.

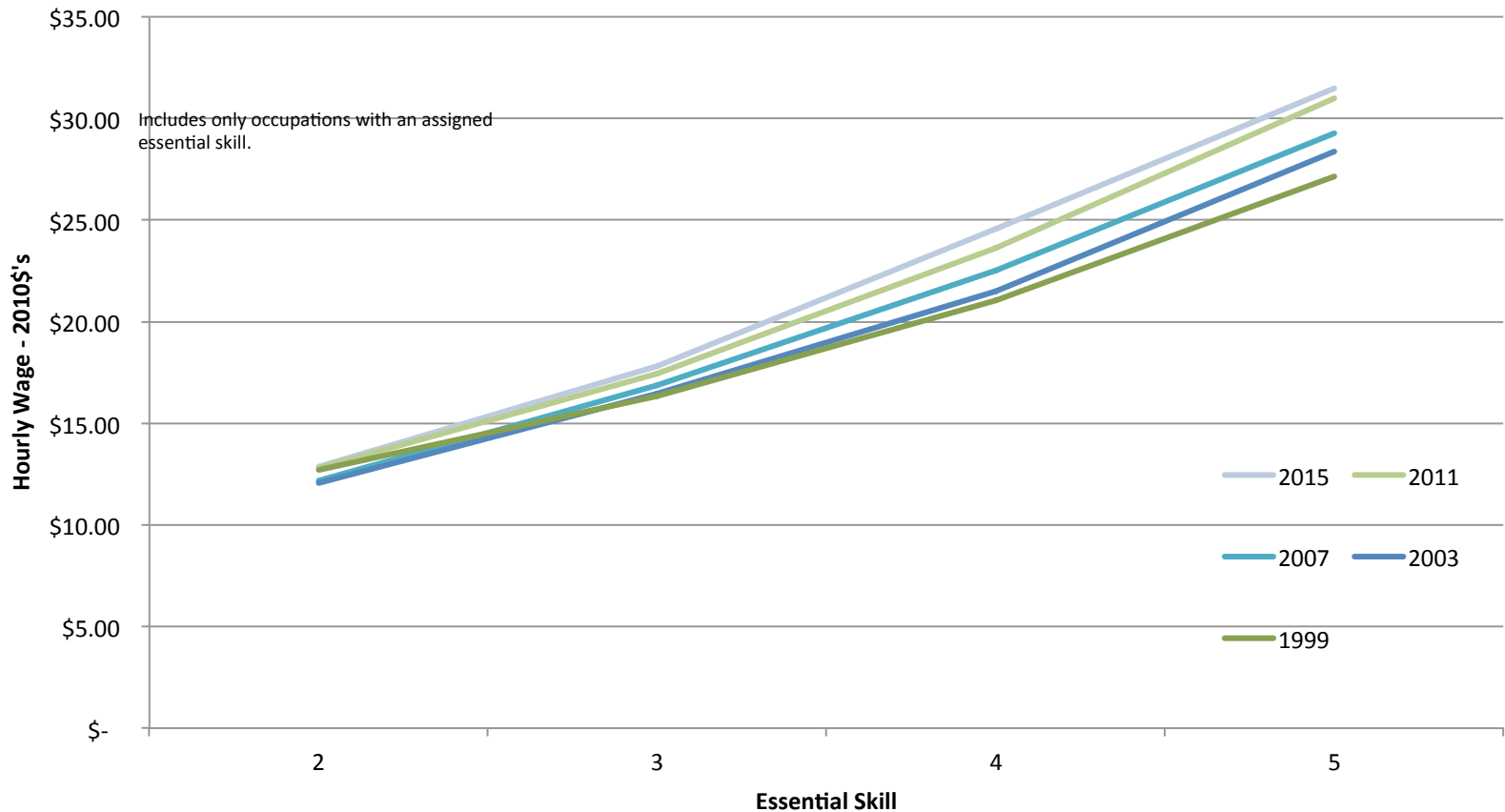


**Skill gain (loss) in the individually-linked synthetic cohort is explained by differences in the cognitive demand of the job**

**Figure 3.29 Estimated effects of participation in various forms of learning and literacy engagement, employed population, aged 16 to 65, Canada 2011**

Variable	Parameter	Estimate	Biased	Standard error	t-value	Probability	Regression
FE12	FE12	-4.1869723	0	1.22608499	-3.41	0.0006	employed - ancill regr
FAET12	FAET12	5.8274333	0	0.55532962	10.49	<.0001	employed - ancill regr
LEARN	LEARN	-0.000289	0	0.00009363	-3.09	0.002	employed - ancill regr
READHOME	READHOME	-0.0027121	0	0.00046356	-5.85	<.0001	employed - ancill regr
READWORK	READWORK	-0.0008909	0	0.00016783	-5.31	<.0001	employed - ancill regr
WRITHOME	WRITHOME	-0.001665	0	0.00012081	-13.78	<.0001	employed - ancill regr
WRITWORK	WRITWORK	-0.0005975	0	0.00010728	-5.57	<.0001	employed - ancill regr
NUMHOME	NUMHOME	-0.001353	0	0.00012361	-10.95	<.0001	employed - ancill regr
NUMWORK	NUMWORK	-0.0008125	0	0.00008818	-9.21	<.0001	employed - ancill regr
TASKDISC	TASKDISC	-0.0006825	0	0.00019098	-3.57	0.0004	employed - ancill regr
ICTWWLE	ICTWWLE	0.3362524	0	0.15430039	2.18	0.0293	employed - ancill regr

# Paradoxically, skill loss overlaps with a period of rapid increases in the wage premia to literacy skill



# Policy questions and implications:

- The fundamental insight offered by our analysis is that employers are dumbing down what should be cognitively demanding Level 2 and 3 jobs (so one seems no impact of skill shortage on wages)
- In sharp contrast the impact of occupational skill shortage and depth of shortage has a significant impact on wage growth in Levels 4 and 5
- We hypothesize three linked market failures are impairing the speed of adjustment:
  - A lack of information on costs, benefits and ROI to market participants
  - Very poor quality instruction due to moral hazard confronting training providers
  - Cultural inertia on the part of employers. Few of them apprehend the changes being induced by automation and foreign competition

## **The shifting demand for skills and the displacement of low skilled workers demands a policy response:**

- Increasing the supply of key cognitive skills by:
  - Increasing the average cognitive skill level of students, and reducing the proportions of students with skills below Level 3 leaving the secondary system by assessing and upgrading the skills of students prior to graduation
  - Increasing the average cognitive skill level of students, reducing the proportions of students with skills below Level 3, entering and leaving the tertiary system by assessing them at the point of program entry, upgrading their skills as needed and assessing and certifying their skill levels at the point of program exit

## **The shifting demand for skills and the displacement of low skilled workers demands a policy response:**

- Increasing the supply of key cognitive skills by:
  - Upgrading the cognitive skills of workers with skills below Level 3. This requires the government to:
    - Induce employers to increase the knowledge and skill intensity of their jobs to achieve higher rates of productivity growth
    - Create incentives for employers to assess and upgrade the skills of their workers with low skills
  - Increase the utilization of the available skill supply by supply of key cognitive skills by Create national micro credentials for key cognitive skills that employers can rely on in recruitment, selection and promotion processes

## **Policy advice:**

- Redouble efforts to reduce the proportion of youth leaving the secondary system, entering and leaving the post-secondary system. Force training providers to publish data on program efficiency and effectiveness i.e. average skill gain and skill gain per point
- Only investments in adult skill upgrading that confers Level 3 or above will yield full returns
- Avoid large investments in so called 21<sup>st</sup> Century skills