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# Introduction

The development of reading proficiency is a dynamic process that involves gains and losses. Whereas gains at early ages depend on initial reading proficiency, gains and losses at later ages are affected by whether or not individuals engage in activities to maintain their skills. The value of such research for addressing internationally shared policy concerns is high. This chapter introduces the key concepts examined in this report.



## PISA AND THE PISA RE-ASSESSMENT

The Programme for International Student Assessment (PISA) is a valuable source of information about the skills and competencies of youth. Data from the assessment describe the competencies of 15-year-olds (hereafter PISA-15) and examine how those skills are distributed throughout this population and in various sub-populations.

However, policy makers are also interested in knowing how the competencies developed by the age of 15 will affect students' life trajectories, particularly their educational attainment, transition into the labour market, and the continuation of skills development. PISA, alone, cannot answer these questions.

Thus, when Canada participated in the first implementation of PISA in 2000, it used the assessment as the starting point for a longitudinal study of young people. In addition to the assessment of reading, mathematics and science, the 15-year-old students in Canada and their parents also completed a detailed questionnaire, called the Youth in Transition Survey (YITS). At two-year intervals after the initial assessment and interview, the original PISA-15 respondents were contacted and asked to provide information on their activities related to education and employment, their life choices, and their attitudes. These data have given rise to a rich body of research related to a wide variety of public policy issues.

The direct measures of student skills in PISA helps to explain longitudinal patterns in the YITS data because proficiency in reading, mathematics, and science is associated with the degree of success of many transitions during a young person's life. An analysis of the role of competencies in shaping the trajectories of young people can be found in *Pathways to Success: How Knowledge and Skills at Age 15 Shape Future Lives in Canada* (OECD, 2010a).

This report further explores the transition from adolescent to adult by examining gains in reading competency between the ages of 15 and 24. The analysis uses the PISA-YITS data as well as a PISA re-assessment at the age of 24 (hereafter PISA-24), a selection of PISA questions that were administered in 2009 to a subset of the original PISA-15 students in Canada. The result is a longitudinal survey of youth that begins with a reading assessment at age 15, ends 9 years later with a reading re-assessment at age 24, and contains a detailed accounting of their education and employment pathways in the intervening years.

The purpose of this report is to examine how reading proficiency has progressed in the years following the PISA assessment. These years, from age 15 to 24, contain many key transitions in the lives of young people, including completing compulsory education, progressing to post-secondary programmes, and entering into the labour force. Improvements in reading proficiency measured at age 24 in relations to the students' initial proficiency level at age 15, some of these students' life choices, and other factors were analysed.

The report investigates the magnitude of learning gains or losses following compulsory education, and how these gains and losses vary across gender and immigration status, and other demographic characteristics. It also examines whether competencies and learning habits at age 15 are related to later skills acquisition, and the characteristics or factors associated with proficiency gains between the ages of 15 and 24.

Are early disadvantages persistent? Are there policy interventions that might help low achievers improve more over time? The report also studies the relationship between post-secondary education and improvements in reading proficiency, and how work experience and other life transitions affect learning gains.

## A DYNAMIC VIEW OF LEARNING

The notion that knowledge and skills can be gained and lost has long been accepted by educationists, but attempts to measure those gains and losses have been largely unsuccessful. Education experts engaged in curriculum development are keen to determine how learning losses and gains are related to future economic and social outcomes, for both the individual and society. To do so, they need to understand the dynamics of skills acquisition well beyond the period of compulsory education.

The concept of learning gains and losses takes a dynamic view of learning rather than a cumulative view. In other words, it cannot be assumed that once something has been learned it will be retained. While new learning may rely on a foundation of existing skills and abilities, these existing skills must be maintained through continuous use or they may be lost.

Skills development can be characterised by both gains and losses, depending on the age and the experiences of the individuals. Previous research suggests that skills development actually peaks between the ages of 25 and 35 (Desjardin, et al., 2005). A shortcoming of this study and many other similar studies is that they rely on age differences



drawn from a cross-sectional survey. As a result, it is difficult to determine if differences in age-related changes between young adults who had embarked on various educational or life trajectories were the result of variations in initial reading proficiency between groups or of other factors that intervened along these trajectories.

Very little is known about skills development between the end of compulsory education and the early years of a work career. Canada decided to longitudinally follow 15-year-olds who participated in PISA in 2000 and to re-test them at age 24 in an effort to fill this gap in knowledge.

## PATTERNS OF SKILLS DEVELOPMENT

Early models examining the development of skills suggest that the rate at which students acquire skills is affected by their existing communications skills, such as vocabulary and verbal reasoning (Dreyfus and Dreyfus, 1986). The hypothesis in these early models is that the higher the level of existing skills, the better students are able to understand new material and draw inferences from texts. According to these models, differences between high- and low-performers as age increases would tend to persist. This is in line with the limited longitudinal evidence that does exist (e.g. Wylie and Hodgen, 2007; 2011; Bynner and Parsons, 2009). Less is known empirically, however, about whether or not the differences diverge or converge over time. Catell's (1987) investment theory, for example, suggests a divergence or "fan spread" pattern, i.e., the stronger get stronger, and the weaker get weaker over time. Substantial research shows that gaps in performance are persistent, but also that a deterministic view of skills development is misguided (Beswick, et al., 2008). It might be possible that convergence is possible in critical skills-formation periods, such as during adolescence. During this period, skills of all kinds are thought to increase up until at least the early 20s. Beyond this period, however, certain types of skills may begin to decline, particularly those relating to cognitive mechanics, such as attention capacity, processing speed, reasoning, working memory and spatial ability (see Catell, 1971). The rate of decline is thought to be subject to levels of mental, physical and social activity which are, among other things, a function of lifestyles and the type of occupations people enter (for a recent review, see Desjardins and Warnke, 2012). Accordingly, convergence seems more likely during critical skills-formation periods, when all kinds of skills are being acquired, but then divergence may be more likely as adults enter different pathways that influence skills formation.

Although skills may be developed through education, they can also decline rapidly through disuse. The "summer slide", whereby students' skills deteriorate over the course of the summer break, first identified by Heyns (1978), provides an example. Moreover, the rate of skills decline varies greatly depending on the number and type of organised activities available to students. Thus the summer period has often led to increasing inequality in competencies between socio-economic groups that are presented with different opportunities for learning during the months when school is not in session (Cooper, et al., 1996). Some evidence suggests that the summer decline has lasting consequences associated with lower educational attainment for socio-economically disadvantaged students (Alexander, et al., 2007).

As gains in skills continue throughout adolescence and into adulthood, a variety of factors confound the relationship between initial reading proficiency and its rate of growth. Evidence about changes in reading skills in the adult population in Canada, taken from the Adult Literacy and Lifeskills survey (ALLS), suggests that reading skills are characterised more by decline than growth after age 25, with greater loss among those with lower initial proficiency (Desjardins, et al., 2005). The transition from reading skills growth to decline suggests a corresponding shift from the importance of initial proficiency to ongoing maintenance through practice.

## MEASUREMENT OF LEARNING GAINS AND LOSSES

Many countries have instituted national assessments during compulsory education to monitor progress and to benchmark their progress with other systems. In Canada, the Pan-Canadian Assessment Program reports on the assessment of 13-year-olds in reading, mathematics and science in the ten provinces so that competencies at that age can be compared across provinces (Council of Ministers of Education, Canada (CMEC) 2008). In addition, there are a number of standardised student tests administered by individual provinces. Comparisons of results between students and systems can shed light on policy-sensitive factors that are associated with higher proficiency. However, these assessments are not designed to show how proficiency changes over the course of an individual's life. Data from PISA and the re-assessment are uniquely placed to answer those questions.

Using PISA to measure skills gains and losses has several advantages. First, PISA is an assessment of reading proficiency that is not tied to curricula, but is generally representative of essential life competencies. In addition, the measure of competencies in PISA is internationally comparable. Second, when PISA was implemented in Canada, it was accompanied by a detailed survey of students, parents and school principals, and was linked to a longitudinal survey of the students.



This data record is crucial for explaining the observed proficiency gains over time. Third, PISA assesses proficiency at the age of 15, when students are nearing the end of compulsory education. The nine years between assessments is an extremely important period for skills development.

Measuring learning gains over such a long time period presents a challenge for research design. It requires a sustained investment to pay for longitudinal surveys and expensive individual assessments for a relatively large sample of youth.

Because there are now over 70 countries participating in PISA, the value of sharing investments in PISA-related research among them is multiplied. A key policy question underpinning investments in compulsory education: How do competencies gained during compulsory education relate to future learning gains and losses?

The value of such investments in data will be evident from the analysis in this report and in future research using these data. There are potentially three sets of benefits: The first are the results of the analyses themselves. They enable researchers to address such policy issues as the durability of early learning advantages, the value of skills for preparing youth for transitions through post-secondary education and entry into the labour market, and the factors related to ongoing skills development and maintenance.

The second arises from peer learning among the countries participating in PISA. Currently, only a few countries can undertake a similar investment in data. The integration of PISA data with longitudinal data and an additional assessment that can be analysed in relation to subsequent labour-market and social outcomes could lead to significant new policy insights for countries sharing the same policy concerns.

The third set of benefits arises from adding to the store of knowledge concerning methodology. There are many challenges, ranging from sampling and tracking issues in data collection to analytical difficulties. These challenges are briefly discussed in this report, and a detailed description can be found in Cartwright (2012).

## THE IMPORTANCE OF GOOD READING PROFICIENCY

The capacity of education systems to develop human capital is being evaluated in light of the rise in market demand for competencies, and changes in employment requirements that include critical thinking, the use of technology, and innovation. A future-oriented view of education focuses squarely on the importance of foundational skills and lifelong-learning opportunities in order to build and maintain key competencies. This report demonstrates the importance of early reading proficiency, and the benefits of ongoing learning opportunities for continual skills growth.

The report is organised into seven chapters. Chapter 2 describes the three sources of data (PISA-15, YITS, and PISA-24) that were linked to create this database. It also details some of the methodological challenges inherent in this type of data collection and analysis. Chapter 3 provides a descriptive analysis of reading proficiency at age 24 and improvements in proficiency for key population groups. Chapter 4 relates the observed learning gains to expectations for proficiency improvements at age 15 to show how proficiencies may change with age. It also examines learning gains across the various domains of reading proficiency examined in PISA. Chapter 5 considers some of the PISA variables that were key to explaining proficiency at age 15, and considers how these relate to skills gains after the age of 15. It also highlights the critical role of initial reading proficiency in explaining skills gains. Chapter 6 examines education, work and demographic transitions in the lives of young people, and relates these to observed learning gains. The last chapter provides some concluding remarks.

## VALUE OF LONGITUDINAL ANALYSIS FOR DECISION MAKING

This report showcases the depth and breadth of data collected in Canada by combining PISA-15 results with those of a longitudinal survey (YITS) and reassessment of competencies (PISA-24), all at the individual level, and provides examples of the types of analysis that can be conducted with such data. The results yield valuable insights to respond to questions about how reading skills are developed, maintained and lost between the ages of 15 and 24. The report also shows how countries participating in PISA can maximise their investments and how such analyses can provide results that assist decision making based on evidence.

While other approaches can confirm these results, the power of this study stems from the wealth of information available at the individual level. The richness of PISA-15 data, which were gathered from the assessment of reading skills at age 15 and from questionnaires addressed to students, parents and school principals, is coupled with nine years' worth of data on individual pathways through education, labour markets and other important life choices and, most important, a re-assessment of reading skills at age 24 conducted through PISA-24 in 2009.

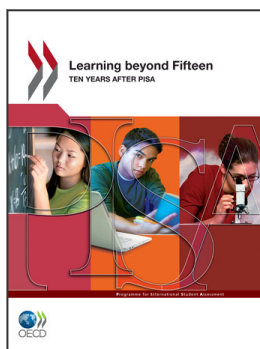


The primary policy lever in developed countries to ensure that all citizens have a good start on lifelong learning is their investment in compulsory education. However, evidence on how reading skills are developed, how they are maintained and how they are lost is scarce. Key policy questions can only be answered by longitudinal analyses related to direct assessments, such as those offered in this study. How do competencies gained during compulsory education relate to future learning gains and losses? Are early advantages and disadvantages persistent? Which policy-relevant factors can increase learning gains for low achievers after the age of 15? Are there patterns of learning gains and losses associated with particular pathways and life choices? Can policies mitigate losses and enhance gains? Results from this study shed light on many of these questions.

## INTERNATIONAL POLICY LESSONS

The growing need for internationally comparable evidence on student performance in compulsory education has prompted over 70 governments to invest in the PISA assessment in 2009. In addition, at least six PISA-participating countries – Australia, Canada, the Czech Republic, Denmark, Switzerland and Uruguay – have chosen to use the PISA assessment as a starting point for a longitudinal survey of youth. Using the results from such longitudinal data provides a realistic understanding of a more dynamic view of learning gain and loss. Though there are opportunities and challenges associated with a re-assessment linked to PISA, the Canadian experience will no doubt encourage others to make similar investments.

Key policy lessons can be drawn from this report that can be used by policy makers in other countries. First, quality compulsory education that equips students with strong reading skills provides them a good foundation for further growth and development. Second, all young people continue to improve their skills, which, given the right circumstances, can reduce the gap between high and low achievers that may have been evident when these individuals were younger. Third, better reading skills enable young people to benefit from higher education, which, in turn, is associated with better learning and employment outcomes.



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