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Education

A REPORT OF THE CANADIAN INDEX OF WELLBEING (CIW)

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 CANADIAN
index
OF WELLBEING
Measuring what matters

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Summary

This report presents a theoretical framework and eight headliners (denoting constructs or themes), with their respective indicators (denoted by quantitative measures), for the Education domain of the Canadian Index of Wellbeing (CIW).

The selection of the eight headliners has been primarily informed by (i) the purposes and the framework underlying the CIW, (ii) a definition of education that integrates the purposes and criteria of the CIW and current scholarly thinking on indicators of education, (iii) a literature review on indicators of education, and (iv) an education expert consultation.

The following list presents the themes represented by the eight headliners, with the corresponding indicators and data sources:

1. Early childhood education and care

- Indicator: Availability of childcare spaces for children 0-5
- Source: Early Childhood Education and Care in Canada (Childcare Resource and Research Unit)

2. Transition to school: developmental health in kindergarten

- Indicator: Developmental health in kindergarten (age 5)
- Source: National Longitudinal Study of Children and Youth (Statistics Canada)

3. Student-educator ratio in public schools

- Indicator: Student-educator ratio in the public school system
- Source: Centre for Education (Statistics Canada)

4. Social and emotional competences in middle childhood

- Indicators: Self report on peer belonging, friendship intimacy, self-concept, prosocial behavior, empathy, and bullying
- Source: National Longitudinal Study of Children and Youth (Statistics Canada)

5. Basic educational knowledge and skills of youth

- Indicator: Math, reading, and science skill test scores
- Sources: Trends in International Mathematics and Science Study (TIMSS; National Center for Education Statistics, US Department of Education); Programme for International Student Assessment (PISA; Organisation for Economic Co-operation and Development)

6. Equality in education: the socioeconomic gradient

- Indicator: Relationship between students' educational skill test scores/postsecondary education participation and their parents' socio-economic status

- Sources: Programme for International Student Assessment (PISA; Organisation for Economic Co-operation and Development); Survey of Labour Income Dynamics (SLID; Statistics Canada)

7. **High school completion**

- Indicator: Percentage of young adults who completed high school
- Source: Labour Force Survey (Statistics Canada)

8. **Postsecondary education**

- Indicator: Participation and attainment in post-secondary education
- Source: Labour Force Survey (Statistics Canada).

A rationale for why these headliner indicators and not others—such as education expenditures or teacher ‘quality’—have been chosen is provided for each headliner, respectively.

Also, issues pertaining to measurement and validation are addressed. In some instances, currently available indicators may, in the future, be complemented and/or replaced by more comprehensive indicators, as soon as availability permits or as soon as the current indicators cease to be collected. These instances are discussed in the respective sections on the individual headliners below.

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I. Introduction: The purpose of the Canadian Index of Wellbeing

The Pan-Canadian network developing the Canadian Index of Wellbeing (CIW) has explicitly stated the vision, goals, and objectives of the CIW (www.ciw.ca), from which we cite (shortened) excerpts in order to set up the forthcoming discussion:

The CIW's vision is "to enable all Canadians to share in the highest wellbeing status by identifying, developing and publicizing statistical measures that offer clear, valid and regular reporting on progress toward wellbeing goals and outcomes Canadians seek as a nation."

The specific goals of the CIW are to:

- Oversee the development and implementation of the CIW that is reflective of Canadian society and in which regional and cultural differences are reflected, nurtured and integrated into the fabric of the work;
- Ensure the ongoing and regular reporting of the CIW through a Communication and Public Engagement Strategy;
- Ensure leading-edge and ongoing research and development of the CIW including further refinement of common standards, pilot testing of sub-indices, collection and compilation of data for health, social, economic, and environmental variables and trends;
- Promote better data collection by identifying gaps in knowledge relevant to measuring wellbeing;
- Increase and expand the CIW network with influential leaders and policy makers so that the CIW has an ongoing impact on policy decisions;
- Contribute to societal understanding (statistical literacy) and use indicators (citizen literacy and engagement); and
- Contribute to a measuring wellbeing movement that will be of benefit to international partners and initiatives.

To this end, the CIW network has formulated, as the result of an elaborate consultation process, a comprehensive framework for the CIW. In this framework, eight domains have been identified as the resources (Michalos et al., 2010) of wellbeing:

1. Environment;
2. Healthy Populations;
3. Education;
4. Time Use;
5. Democratic Engagement;
6. Community Vitality;
7. Leisure and Culture; and
8. Living Standards.

For each domain, an expert team has been commissioned to develop a theoretical framework, and to provide a set of eight headline indicators that can measure and reflect Canadians' wellbeing in the respective domain over time. As a result, the CIW will eventually consist of 8 x

8 headline indicators, all of which can be used individually or as aggregate domain scores, as well as an overall composite score to track the wellbeing of the Canadian people.

As this report addresses the Education domain, an issue to be discussed first is how the Education domain relates to the overall vision and purpose of the CIW. As this implies that there is a relationship between education and wellbeing, it needs to be explicated to what degree and in what way education and wellbeing are related to each other. This, in turn, requires a definition of the two terms. These issues are addressed in the next section.

2. Wellbeing and Education

Given our task of recommending and selecting a set of indicators for the Education domain of the CIW, the definitions of the constructs of education and wellbeing for this context are, evidently, closely aligned with the purposes and definitions presented in the background papers for the CIW. In particular, Michalos et al. (2010) provide a discussion of how the CIW conceptualizes wellbeing, and we reiterate a number of points from their discussion that are of particular relevance. First, wellbeing is defined as a multidimensional construct that encompasses eight domains: Environment; Healthy Populations; Education; Time Use; Democratic Engagement; Community Vitality; Leisure and Culture; and Living Standards. According to Michalos et al. (2010), the selection of these eight domains has been primarily based on philosophical grounds as well as on three rounds of public consultations with national leaders and organizations, community groups, research experts, indicator users, and the Canadian public. The authors acknowledge that the validation of this framework is going to be one of the major tasks for future research on the CIW, especially so because a stringent theoretical framework that would allow one to derive specific, empirically testable hypotheses, does, as of yet, not exist. Given this situation, Michalos et al. (2010) delineate a conceptual framework to guide the development of the CIW in a pragmatic way—that is, by continuously combining and integrating relevant empirical findings and theoretical considerations. This guiding conceptual framework is captured in a quotation from Michalos et al. (2010, p. 3):

Wellbeing is at the core of the mandala, as the unifying concept of our efforts to measure how Canadian society and individual Canadians are progressing. The core is surrounded by three concentric circles that symbolize the resources we draw upon for our wellbeing. Each of the resources identified in these circles is a domain of the CIW system. The personal resources for wellbeing in the first concentric circle from the core – health, education and time – are the resources that each of us needs to manage our personal wellbeing. The public resources for wellbeing in the second concentric circle – living standards, community vitality, culture and civic engagement – are the resources we draw upon from the public domain that we live in, from our local communities to the broader society. The ecosystem resources for wellbeing in the outer circle – ecosystem health – encompass and affect all of the other circles and domains. We rely on ecosystem health for the natural resources required to sustain human wellbeing in all its manifestations as measured in the domains of the CIW system and summarized in the CIW itself.

So, within the mandala of wellbeing, education is one of the three core personal resources that ‘each of us needs to manage our personal wellbeing’. Having revisited the CIW’s working definition of wellbeing, we now provide our working definition of education. This working definition has been devised with an eye toward the stated purposes of the CIW and the acceptability criteria for indicators or composite indices to be considered for inclusion in the CIW (Michalos et al., 2010). Three of the acceptability criteria that specifically influenced our definition of education are the following:

1. Relevant to the concerns of our main target audiences;
2. Easy to understand; and
3. Comparable across jurisdictions and groups.

Given these three acceptability criteria, our working definition of education was intended to include widely accepted and generally understood notions of what education, or an ‘educated society’, is, because (i) the general public is one of the main target audiences, (ii) adherence to common usage of the term education will facilitate understanding, and (iii) a widely applicable definition will facilitate comparisons across jurisdictions and groups. As a start, we consulted English dictionaries for their definitions of education. The definition of the Online Oxford English dictionary, reprinted here, succinctly captures the essence of the definitions we encountered:

Education: The systematic instruction, schooling or training given to the young in preparation for the work of life; by extension, similar instruction or training obtained in adult age. Also, the whole course of scholastic instruction, which a person has received.

(Online Oxford English Dictionary)

This definition served as a starting point, which we then elaborated based on the purposes of the CIW. From among the stated objectives of the CIW, the following ones seemed particularly relevant to the definition of the construct of education:

- Promote a shared vision of what really constitutes sustainable wellbeing and the elements that contribute to or detract from it;
- Measure national progress toward, or movement away from, achieving that vision;
- Stimulate discussion about the types of policies, programs and activities that would move us closer and faster toward achieving wellbeing.

These purposes clearly demand a comprehensive approach toward the construct of education. In the next section, we present theoretical considerations from the current scholarly literature, allowing us to elaborate the general dictionary definition of education provided above, with regard to these purposes. The section is divided into three parts, according to the following themes:

1. A lifespan development approach to education;
2. Identifying common domains and content areas of education; and
3. Aligning content areas of education with the CIW.

2.1 A lifespan development approach¹

The CIW intends to articulate and ‘promote a shared vision of what constitutes *sustainable wellbeing*’ (www.ciw.ca; italics added for emphasis), and it is necessary to reflect upon the implications of this purpose for the definition of education. Education is an inherently developmental and intergenerational endeavor, as it requires learning over time, typically transmitted or facilitated by teaching of one generation (of teachers, parents, professionals, etc.) to the next (students, children, employees). Therefore it is, obviously, important to pay

¹ A lifespan development approach to education is similarly endorsed by Hayward et al., 2007.

attention to continuity in the educational process. After all, the learners of today are the teachers of tomorrow, and any education gap in one generation will inevitably affect the following ones, and thus enhance or impede the sustainability of the educational process.

Also, as life expectancy has significantly increased over the past century, it is equally important that a definition of education is not restricted by the impulse to equate education with schooling, and the respective age group of circa 5 (kindergarten) to 17 (Grade 12; High school completion) or 21 year olds (Grade 16; Participation in apprenticeship programs, college, university); to which we will refer to as K-12 and K-16, respectively. Rather, education is more aptly viewed as a process that begins before school age and extends beyond high school, university, and apprenticeships.

With regard to the age period before the start of formal schooling in kindergarten, this notion is reflected in preschool arrangements, such as childcare and early childhood education provision, that effectively extend a systematically organized education process to the early years. With regard to the years beyond high school and college or university, as well as professional training through apprenticeships, this notion is reflected in the concepts of adult learning and lifelong learning—(Audas & Willms, 2001; Delors, Mufti, Amagi, Carneiro, Chung, Geremek, et al., 1996)—even though it must be noted that these terms have been used inconsistently, and have been matters of philosophical debate (Aspin & Chapman, 2000).

Embracing a view of education that includes the entire life course is in line with the theoretical underpinnings of a lifespan approach to human development (Baltes & Smith, 2004; Baltes, Lindenberger, & Staudinger, 2006; Elder & Shanahan, 2006), an approach that has proven fruitful with regard to uncovering biological, social, and cultural processes that underlie human development. Thus, inclusion of the early years and the adult years in terms of defining education is important for a number of specific reasons. The early years have been found to be developmentally foundational and predictive with regard to later educational outcomes (Thomas, 2006), as well as health (Keating & Hertzman, 1999; Shonkoff & Phillips, 2000)—another personal resource of wellbeing according to the CIW definition. Inclusion of an indicator of access to participation in (high quality) early education will thus facilitate the interpretation of educational outcomes at a later age, as they are inseparably connected. In a similar way, the involvement of adults in education and training throughout the life course, and the corresponding outcomes, is facilitated by skills (e.g., literacy) and attitudes (e.g., motivation) obtained beforehand.

Therefore, in regard to the CIW's purposes to 'understand and promote awareness of why society is moving in the direction it is moving', and to 'stimulate discussion about policies, programs, and activities', the inclusion of indicators of early childhood education and adult education—in addition to K-16 education—are crucial. In particular, such an approach allows for an analysis of education over time and not just for consecutive cohorts, but also allows for monitoring educational trajectories within cohorts—thus clearly having the potential of contributing to an 'understanding and awareness of why society is moving in the direction it is moving'. Second, the lifespan approach to education has the potential to broaden the 'discussion about [educational] policies, programs, and activities' in the sense that it could expand the current mandate of Canada's provincial Ministries of Education—traditionally

pertaining to kindergarten to Grade 12, and more recently, also to post-secondary education—by suggesting the inclusion of early childhood education and adult learning.

2.2 Identifying common domains and content areas of education

One major question regarding the definition of (lifelong) education is about *what domains, or content areas*, (such as reading, numeracy, creativity, or critical thinking) are included in the construct of education (Delors et al., 1996; Doherty, 1997; Hayward, Panno, Colman, & Hayward, 2007; Kornhaber & Gardner, 2006; National Education Goals Panel, 1994).

Therefore, in this section, we attempt to identify domains or content areas that are, with some consistency, regarded as constituents of education and learning. Theories on this topic abound, so once again we refer to the purpose of the CIW for guidance. As mentioned above, the CIW aims to ‘add momentum to the global movement for a more holistic way of measuring societal progress. Therefore, a definition of education should be, likewise, holistic.

At the very least, a holistic definition of education implies that it cannot be restricted to simply one or two domains. For example, solely measuring vocabulary and numeracy skills via items on an intelligence or achievement test does not suffice to holistically represent the construct of education (Delors et al., 1996; Kornhaber & Gardner, 2006; Sternberg, 2004). At the same time, not every domain that is considered to be, at least to some degree, a domain of education can or needs to be included in the CIW, either for practical reasons, or due to redundancy (i.e., overlap with other domains of the CIW). The following examples illustrate this point. Creativity is certainly a widely valued capacity, and instrumental with regard to creating solutions for (new) problems, for creating artwork, for providing leadership in times of new challenges, and so on. In education, numerous subjects, such as writing, and fine arts, are taught with an implicit understanding of fostering creativity. Similarly, employers frequently consider some degree of creativity as an asset in job applicants and their employees (Kaufman & Sternberg, 2006; Nahapiet, 1998; Sternberg, 1997). Despite the fact that creativity is a commonly valued capacity in society and a desirable component and outcome of education, it might not be practical to include an indicator of creativity in the CIW. The main reasons for this are that (i) definitions of creativity seem to vary widely in common usage, that (ii) creativity, as commonly defined by educational researchers (Sternberg, 2004), is, in many respects, inherently context-dependent, and that (iii) attempts to reliably and validly measure creativity have proven difficult and time-consuming (Sternberg, 2004). Thus, the inclusion of an indicator of creativity—despite it being a valued component of education—is simply not practical.

The second example of a holistic definition of education, which implies that education cannot be restricted to simply one or two domains, is Gardner’s educational theory of *multiple intelligences* (Kornhaber & Gardner, 2006). This theory proposes, among other things, the domain of musical intelligence as a universally present and societally valued capacity; one that, in fact, possesses numerous developmentally and culturally important qualities (Wallin, Merker, & Brown, 2000). The inclusion of a musical domain in the definition of education for the present purpose appears redundant, however, as this domain is much more fully and aptly captured in the Leisure and Culture domain of the CIW. So, with some domains of education being excluded for practical reasons (infeasibility of measurement), and others due to overlap with

other domains of the CIW, which domains of education remain? In the following, we attempt to show that a diversity of theories pertaining to the topic shows a certain degree of consensus.

The debate with respect to domains of education has been shaped by a great variety of frameworks and theoretical propositions. Here, we briefly review a number of them—pertaining to (i) an early years perspective, (ii) literacy and multiple literacies, (iii) multiple intelligences, (iv) academic and non-academic competences, and (v) learning to be, know, do, and live together—to examine whether there is some consensus. First, the theories are introduced by a short description of their relevant features. After the introduction of the different theories, a table then juxtaposes their respective domains, to illustrate their similarities and differences, as well as to put them in relation to the domains of the CIW. The section then concludes with a proposition of which domains and content areas of education should be included within the education domain of the CIW.

2.2.1 An early years perspective on education

We begin this section by introducing a framework that addresses the issue of education domains and content areas from a developmental, early years perspective. In line with the lifespan development approach to education that is endorsed here, this framework delineates educational-developmental domains that are considered fundamental with respect to early childhood education and later development in education and health. The framework is based on a review by Doherty (1997) and represents a holistic approach to child development. In essence, the framework suggests that there are five developmental domains that represent a holistic view of child development and reflect a (certain degree of) consensus in the early childhood research literature. The five developmental domains are presented in Table I, with brief descriptions of the constructs underlying the developmental domains. For example, the developmental domain of physical wellbeing and motor development refers to a child’s physical health and wellbeing, and the presence of age-appropriate fine and gross motor skills and coordination (such as holding a pen, or climbing stairs).

Table I. Five developmental domains of school readiness (based on Doherty, 1997)

<i>Developmental domains</i>	<i>Description of underlying constructs</i>
Physical wellbeing and motor development	Includes physical health and wellbeing; age-appropriate fine and gross motor skills, and coordination
Social knowledge and competence	Includes abilities to cooperate, get along with and show respect for others; to communicate feelings appropriately
Emotional health	Includes emotional maturity to delay gratification; cope with failure; ability to concentrate
Communication and language skills	Includes ability to understand others and to verbally express experiences, ideas, wishes, and feelings
General knowledge and cognitive skills	Includes basic familiarity with concepts of story and numbers; ability to memorize information

2.2.2 Literacy and multiple literacies

Literacy, in its numerous forms, has been at the core of educational curricula since the beginning of schooling. In its most common, basic sense, literacy refers to the skill of reading, and is commonly understood to also include the skill of writing. The fundamental importance of literacy in this sense does not require any further discussion, as it is one of the most basic skills for the acquisition of information and knowledge. Of similar importance is the skill of numeracy, and it is, in the public debate, closely associated with literacy, as it is considered one of the core basic skills to be learned in school. This notion is aptly reflected in the catch phrase of the '3 Rs': Reading, writing, and arithmetic. Due to the undisputed importance of literacy as a basic skill, the term's use in public and scholarly debates on education has been widely popular, even dominant at times (Wallis & Steptoe, 2006). The popularity of the term, in turn, has led to the phenomenon that parents, educators, researchers, and policy makers have used the term 'literacy' or extended versions of the catch phrase '3 Rs' to create higher awareness of or lobby for greater support for other domains of education. For example, interpersonal, social competences have been referred to as social literacy (Arthur & Davison, 2000), and knowledge about environmental issues has been coined as 'ecological literacy' (cf. Hayward et al., 2007). Likewise, the arts have been referred to as the 4th R (Darby & Catterall, 1994), and this has also been done with relationships (Flook, Repetti, & Ullman, 2005), (social) responsibility (Northwest Regional Educational Laboratory, 1997), and so forth.

This trend of subsuming different educational domains or content areas under the term literacy is represented well in the emergence of the term *multiple literacies*. For the present purpose, it is important to capture the actual constructs that are behind the numerous literacy labels. In Table 2, we list a number of these multiple literacies (which are equivalent to knowledge domains or content areas of education), and include brief descriptions of the underlying constructs to which they refer (cf. Hayward et al., 2007)². For example, the knowledge domain of civic literacy refers to the knowledge and capacity that is considered necessary to 'make sense of the world', to be 'an effective citizen', and particularly emphasizes the relevance of political awareness and involvement.

² The framework of multiple literacies is central to the theoretical considerations and recommendations proposed by Hayward et al. (2007).

Table 2. Multiple literacies as knowledge domains of education (cf. Hayward et al., 2007)

Literacy/ knowledge domain	Description of underlying construct
Civic literacy	Knowledge and capacity to make sense of the world; knowledge to be effective citizen, particularly in regard to political, democratic awareness and involvement
Basic adult literacy	Ability to read, speak, write, and count
Arts literacy	Ability to understand, participate in, and value the arts, and to apply creativity to problem solving
Media literacy	Understanding of how the media works; critical thinking about the world in which we live
Multicultural literacy	Knowledge of, respect for, and appreciation of one's own and others' cultures
Ecological literacy	Ecological knowledge, values, attitudes/beliefs, and behaviour
Health literacy	Ability to read, understand, and act on health information
Food and nutrition literacy	Understanding the connections between food production, safety, and quality, and organizing one's nutrition accordingly
Indigenous knowledge literacy	Includes local, traditional, environmental, and ecological knowledge; experience-based, including holistic social, philosophical, and spiritual values
Statistics literacy	Ability to understand, interpret, and apply statistical information
Scientific literacy	Knowledge of scientific facts and methods, and application to problem solving and decision making

2.2.3 Intelligence and multiple intelligences

Numerous theories related to learning (from the fields of education and psychology) focus on the construct of intelligence, and the related constructs of problem solving and creativity. Gardner's theory of multiple intelligences (Gardner, 2004; Kornhaber & Gardner, 2006), briefly addressed above, is a prominent example. Due to two characteristics of the theory, it is particularly relevant for this discussion. First, the theory defines intelligences as societally valued capacities, which is similar in approach to the CIW insofar as the CIW also aims to reflect and to capture Canadian values. Second, the theory defines intelligences as universally present human traits, which is also in line with the CIW, as the CIW intends to solely include constructs that can be meaningfully compared across diverse groups and jurisdictions in Canada, as well as internationally (Canadian Index of Wellbeing Network, 2008).

Gardner's theory (2004) proposes eight intelligences, which are presented in Table 3. As in the case with literacies, Gardner's theory has stretched the boundaries of the construct of intelligence by subsuming a number of related constructs under a common label. Therefore, we again provide brief descriptions of the capacities to which the different intelligences are referring. So, interpersonal intelligence, for example, refers to the capacity to understand the motives, intentions, and feelings of others and to cooperate with others.

Table 3. Multiple intelligences, reflecting universal existent, socially valued capacities (Gardner, 2004)

<i>Intelligence</i>	<i>Description of underlying capacity</i>
Linguistic intelligence	Capacity to learn and use spoken and written language for expression, communication, and learning
Logical-mathematical intelligence	Capacity to analyze and solve problems and to use mathematical concepts and operations
Bodily-kinesthetic intelligence	The capacity to use the body for problem solving, and to coordinate body movements via mental abilities
Spatial intelligence	The capacity to recognize and use space and patterns
Musical intelligence	Capacity to learn, appreciate, recognize, and perform musical patterns
Interpersonal intelligence	The capacity to understand and cooperate with others.
Intrapersonal intelligence	Capacity to understand emotions and to self-regulate
Naturalistic intelligence	Capacity to understand and use natural and environmental features

2.2.4 Academic and non-academic skills

In many cases, education outcomes, educational achievement, or indicators of education are perceived as pertaining to measurable knowledge and skills in the curricular areas of educational institutions, such as schools and universities. That is, in order to gauge how successful the educational process in schools is, tests of literacy (reading and writing) and numeracy, as well as of knowledge in science classes (e.g., biology) have typically been used as measuring sticks. In several cases, grades based on tests and performance in foreign languages, humanities (e.g., history), and the fine arts (e.g., music) are used as additional indicators of academic achievement, either individually, or jointly. The latter is the case when grades from different subjects are combined to calculate Grade Point Averages as indicators of overall educational achievement. Also, using high school completion or college graduation as an indicator of education, by definition, takes into account performances and grades from subjects across the entire curricular spectrum.

In contrast to all indicators of subject-specific knowledge, skills, and performance, there is a whole range of desirable educational outcomes that cannot be assigned to the category of academic achievement; for example, social competences, such as getting along with peers, and emotional competences, such as dealing with one's own feelings. Such competences are widely valued in society, and it is frequently stated that fostering them through the educational process is therefore desirable (Bear, Manning, & Izard, 2003; Delors et al., 1996; Doherty, 1997; Gardner, 2004; Izard, Trentacosta, King, & Mostow, 2004; Mayer, Roberts, & Barsade, 2008; Zigler & Bishop-Josef, 2006; Zigler & Styfco, 2008). These competences have often been categorized as non-academic, in contrast to academic competences; and a number of labels, such as moral education, character education, emotional intelligence, soft skills, social capital, respect, citizenship, and social responsibility, have been used to refer to these non-academic constructs. Here, we present one prominent example that illustrates how the realm of social competences has been explicitly integrated into the mandate of the public school system. In

British Columbia, the Ministry of Education has included ‘social responsibility’ as one of the four main performance standards, next to reading, writing, and numeracy. According to the Ministry’s background documents, their definition of social responsibility reflects broadly accepted values. It is made up of four components: (i) Contributing to the classroom and the community, (ii) solving problems in peaceful ways, (iii) valuing diversity and defending human rights, and (iv) exercising democratic rights and responsibilities. The intent behind this vision is, in our view, to be welcomed and laudable. With regard to the task at hand, the intent behind a social responsibility mandate (or any similar construct) is associated with a challenge, namely, the challenge of measuring such a construct. We will discuss issues pertaining to measurement in a later section, however; the point being made here is that the realm of social and emotional competences, in one form or another, features prominently in numerous debates on what domains are essential in the construct of education. In Table 4, we list a number of academic and non-academic skills, competences, (curricular) subjects, and concepts, and provide a brief description of them. For example, the term ‘sciences’, in this case, is used to refer to the knowledge and skills taught in subjects such as physics, biology, and chemistry.

Table 4. Examples of academic and non-academic skills taught or mandated in educational settings

<i>Academic and non-academic skill/subject</i>	<i>Description of content area</i>
Literacy	Skills pertaining to reading and writing
Numeracy	Skills pertaining to numbers and mathematics
Problem solving	Ability to solve (new/unfamiliar) problems
Critical thinking	Ability to analyze, reflect upon, and question information
Sciences (e.g., physics, biology, chemistry)	Subject areas that typically use experimental and empirical procedures to understand natural phenomena
Humanities (e.g., social studies, history, religion)	Subject areas that study the human condition via analytical, critical, and speculative methods
Fine arts (e.g., music, theater)	Subjects associated with analysis, creation, and performance of music, paintings, plays, etc.
Social responsibility	Concept referring to community involvement, mediation, promoting human and democratic rights and responsibilities, and civic engagement
Emotional intelligence	Capacity to understand and relate to others, and to cope with one’s own emotions
Empathy	Ability to understand, be sensitive to, and vicariously feel the feeling of others
Respect and tolerance	Traits referring to accepting and valuing diversity, considerate behavior toward others
Citizenship	Awareness and practice of one’s social responsibilities and rights

2.2.5 Learning to be, know, do, and live together

A prominent UNESCO-commissioned review on education (Delors et al., 1996) defines four so-called pillars of learning that are considered to represent the full scope of a comprehensive

life-long learning concept. The framework has been adopted by the Canadian Council on Learning (CCL), a Canadian non-profit organization with the mission to translate educational research into effective educational practice. The Composite Learning Index has been devised by the CCL to systematically track learning across Canada, in order to inform the society in general, and educators and policy makers in particular with regard to the trends and developments of the state of learning in Canadian communities (www.ccl-cca.ca/CCL/Reports/CLI). The Composite Learning Index is thus quite similar in purpose to the CIW, though it has a narrower focus (on education solely). Therefore, we present the four pillars of learning and provide brief descriptions of them in Table 5. The second pillar, learning to know, for example, is defined as the development of skills and knowledge such as numeracy, critical thinking, and general knowledge.

Table 5. Four domains of education (pillars of learning) according to the Delors Report (Delors et al., 1996), adopted by the Canadian Council on Learning (CCL)

<i>Pillars of learning</i>	<i>Description of constructs³</i>
Learning to be	Learning that contributes to the development of a person’s body, mind and spirit. Skills in this area include personal discovery and creativity, and can be acquired through reading, use of the internet and activities such as sports and the arts
Learning to know	The development of skills and knowledge needed to function in the world, including literacy, numeracy, critical thinking and general knowledge
Learning to do	The acquisition of applied skills related to occupational success, such as computer training, managerial training and apprenticeships
Learning to live together	Values of respect and concern for others, fostering social and inter-personal skills, and an appreciation of the diversity of Canadians

2.3 Aligning domains and content areas of education with the CIW

The previous section reviewed five theoretical frameworks with respect to the domain or content areas of education. In this section, we now attempt to integrate the information from those theoretical frameworks in the following way. First, it is examined to what extent there is consistency among the theoretical frameworks with regard to the domains or content areas that are proposed to be constituents of education. Second, it is examined in what way those proposed domains or content areas of education relate to the (other) domains of the CIW. This is done in order to determine whether there is some conceptual overlap among the domains of education as conceptualized in some frameworks, and the domains of wellbeing as conceptualized by the CIW. One might, in fact, expect such overlap. After all, in the definition of the wellbeing construct according to the CIW, education is considered a personal resource with respect to one’s overall wellbeing. Based on this argument, Hayward et al. (2007) have suggested identifying educational domains (as the eight headline indicators) that are directly

³ The definitions are cited from the Canadian Council of Learning website (<http://www.ccl-cca.ca/CCL/Reports/CLI/AboutCLI.htm>)

related to the other seven CIW domains, respectively. Accordingly, the Education domain would include headline indicators that are indicators of education with regard to Environment; Healthy Populations; Time Use; Democratic Engagement; Community Vitality; Leisure and Culture; and Living Standards.

Herein, we take another approach, due to the following argument. In our view, the fact that health, Democratic Engagement, and so forth, are already represented by their own respective domains in the CIW, actually provides justification for not also including these constructs within the education domain. Theoretically, the inclusion of, for example, health education, would present interesting opportunities for examining the link between health-related education and health outcomes. The same would be true, of course, for the other domains. However, the argument for not duplicating indicators of the CIW domains within the education domain is primarily a pragmatic one, as it will leave space for domains of education that otherwise, due to space restrictions, would not be captured at all. In other words, we focus on identifying those domains that are not only relevant to education, but also are not captured by the other domains of the CIW. This idea is depicted in Table 6. In Table 6, the five frameworks on educational domains reviewed above are shown in the first five columns, and put in perspective with regard to the Education domain and the seven other domains of the CIW. This is done in such a way that those domains and content areas of education that are consistently present in the theoretical frameworks are horizontally aligned. For example, every construct related to social and emotional competences (e.g., interpersonal intelligence, intrapersonal intelligence, social responsibility) is listed in the first row, always in the column corresponding to one of the five theoretical frameworks reviewed above (e.g., Gardner's theory of multiple intelligences). In addition, these concepts are then aligned with the domains of the CIW, shown in the right column. For example, physical health and wellbeing (left column) is aligned with the Healthy Populations domain of the CIW (right column), and musical intelligence (second column from left) is aligned with the CIW domain of Leisure and Culture (also right column). Finally, as can be seen, the Education domain has been divided into three categories— (i) social and emotional competences, (ii) basic educational knowledge and skills, (iii) overall educational achievement. These three categories resulted from clustering those domains of education that (a) are consistently present in the reviewed theoretical frameworks, and that (b) are not primarily related to any other CIW domain.

Table 6. Juxtaposition of five frameworks on educational domains with the CIW domains

<i>Early years/ School readiness perspective</i>	<i>Literacy/ multiple literacies</i>	<i>Multiple intelligences</i>	<i>Academic/ non-academic mandates/ subjects</i>	<i>Pillars of Learning</i>	<i>CIW domains</i>
Social knowledge and competence; Emotional health	Basic Statistics; Scientific	Interpersonal; Intrapersonal	Social responsibility; Empathy; Emotional intelligence; Respect and tolerance	Learning to live together	Education - Social and emotional competences
General knowledge and cognitive skills; Communication and language skills		Logical – mathematical; Linguistic	Numeracy, mathematics; Literacy, reading, writing; Problem solving; Critical thinking	Learning to know	- Basic educational knowledge and skills
		Musical; Spatial	English; Foreign languages; History; Fine Arts; Humanities; Sciences	Learning to know Learning to do	- Academic achievement, attainment, and participation
Physical well-being and motor development	Health; Food and nutrition	(Bodily-kinesthetic)	Physical education; Sports	Learning to be	Healthy Populations
	Arts	Musical; Spatial	Music education; Band; Fine Arts	Learning to be	Leisure and Culture
	Multicultural		Relationships (Social responsibility)	Learning to live together	Community Vitality
	Civic; (Media); Multicultural		Citizenship (Social responsibility)		Democratic Engagement
	Ecological; Indigenous knowledge; Food/nutrition	Naturalistic	(Natural sciences; Social studies)		Environment
				(Learning to be)	Time Use
					Living Standards

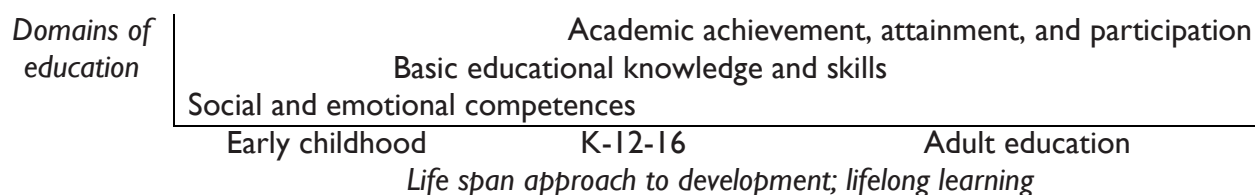
This juxtaposition allowed us to reduce the diversity of labels by collapsing similar constructs into fewer general domains of education. In addition, for reasons described above, constructs that are already captured by the other seven domains of the CIW were excluded from further consideration for the education domain. As a result of this procedure, we ended up with three broad domains within the Education domain:

- Social and emotional competences;
- Basic educational knowledge and skills (literacy, numeracy, science, problem solving); and
- Overall academic achievement, attainment, and participation.

The third domain, overall academic achievement, attainment, and participation, requires some clarifying commentary. As can be seen, a range of different subjects and constructs has been collapsed into this domain. This has the following reason. Developmentally, there is a sequence to the three proposed domains. Social and emotional competences develop during the early years, and continue to develop throughout life. Basic educational knowledge and skills, such as literacy and numeracy, typically develop during the first years of school—even if the cognitive foundations evidently also develop during the early years, and even though they may also be refined throughout the life course. Finally, education beyond the basic skills, for which the social and emotional competences and basic educational knowledge and skills build the foundation (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Doherty, 1997; Duncan et al., 2007; Flook et al., 2005; Trentacosta & Izard, 2007; Wentzel, 1991), by definition, occur later. The developmental sequence goes hand in hand with continuing diversification and differentiation.

Whereas some social and emotional competences as well as basic educational knowledge and skills are, ideally, mastered by everyone, not everyone needs to master a large range of increasingly specialized educational skills (e.g., technological expertise, creative writing, craftsmanship). Rather, everyone ideally finds a niche within which to realize her or his own potential. Accordingly, at the more specialized level, it makes intuitive sense to focus on involvement, attainment, and/or participation in a more advanced or specialized educational process, rather than on particular outcomes in specific educational domains. In Figure A, this notion of developmental sequence—corresponding to a lifespan developmental perspective on education—is illustrated by the vertical sequence (left-early; right-late) of the proposed three domains. In addition, the vertical order corresponds to the order of developmental importance, with the most fundamental domain—social and emotional competences—at the bottom (Bear et al., 2003; Caprara et al., 2000; Trentacosta & Izard, 2007; Wentzel, 1991), and the more differentiated domains at the top.

Figure A. Representation of educational domains according to developmental sequence and order of developmental relevance



So far, we have elaborated the common usage dictionary definition of education, provided in the beginning, in two ways: First, a lifespan approach to development and learning has been endorsed. Second, three domains of education—social and emotional competences, basic educational knowledge and skills, and overall academic achievement, attainment, and participation—have been recommended for inclusion in the CIW. In the following section, we add two further aspects to our theoretical elaborations on the definition of education. These two aspects are equity and equality in education, and the related issues of participation in and access to education.

2.4 Equity and equality and the socioeconomic gradient in education

In a society that values equity and equal rights, it is important to see whether all groups of society have equitable access to and opportunities in education. In order to address this issue, we would like to begin by differentiating between our usage of the terms equity and equality. In this context, we use *equity* to mean 'equity in access to and opportunities in education', and *equality* to refer to 'equal outcomes with regard to education'. Equity is a fundamental principle of human rights and democratic principles. In order to assess equity at a societal level, it is important to examine whether certain (sub)groups of the population are systematically and unfairly excluded from any aspect of the educational process (i.e., child care, school, post-secondary education, training)⁴. In order to assess equality (i.e., an indication of inequality in outcomes), on the other hand, one may examine whether certain (sub)groups of the population obtain systematically different results than others in the educational process (e.g., different high school graduation rates for girls and boys).

It is important to realize that inequity almost inevitably goes hand in hand with (and leads to) inequality; however, inequality does not always (or exclusively) has to be indicative of inequity, as other factors might also be associated with unequal outcomes (e.g., contextually and/or culturally mediated differences in terms of educational needs, aspirations, values, and priorities). In order to understand in what ways equity and equality in education are related to each other in our society, it is therefore critical to jointly evaluate both.

⁴ The distinction between equity and equality is similarly made in the CIW domain report for Healthy Populations (Labonté, Muhajarine, Winquist, & Quail, 2009).

From a pragmatic indicator approach, the task of assessing equality is more straightforward, and has been examined in numerous contexts. For the present purpose, of particular relevance is the work on so-called socioeconomic gradients in education (Willms, 1999; Zigler & Styfco, 2008; Siddiqi, Subramanian, Berkman, Hertzman, & Kawachi, 2007; Willms, 1999; 2006). Basically, socioeconomic gradients refer to the relationship between individuals' socioeconomic status (as measured by family income or level of education) and their outcomes in the domain of interest, in this case, education. The concept is most appropriately presented by means of a scatter plot with a fitted regression line, showing the correlation between socioeconomic status and educational outcome. The stronger the relationship is, the higher the correlation, and the steeper the gradient (i.e., the regression line). The steepness of a socioeconomic gradient thus reflects to what degree students from low socioeconomic backgrounds systematically perform worse in education compared to students from higher socioeconomic backgrounds. What is particularly interesting in this regard is the finding that flatter gradients—representing small educational differences between low and high socioeconomic backgrounds—seem to go hand in hand with overall higher average performance (Siddiqi et al., 2007; Willms, 1999). In other words, increasing educational outcomes at the low end of the socioeconomic spectrum does not occur at a cost for the high end of the spectrum; rather, it is associated with higher educational performance in that range as well (cf. Willms, 1999). From a social policy perspective—which is one of the lenses of the CIW—it appears to be adequate to track the steepness and overall level of the socioeconomic gradient for education, as socioeconomic status can be affected by practices and public policies.

Socioeconomic status is not the only characteristic that is related to educational outcomes. Minority groups, such as Aboriginal people, have, since the time of contact, been systematically disadvantaged and excluded from education, and this situation persists to a considerable extent to the present day (Tait, 1999). Similarly, children from some immigrant groups with English as a second language have struggled educationally (Thiessen, 2001). As stated above, a socioeconomic gradient in educational outcomes reflects inequality. Monitoring in what way these inequalities are associated with inequities (e.g., differences in access) is thus important (Tait, 1999; Thiessen, 2001). Therefore, we recommend tracking data for minority groups with regard to their educational trajectories and access to educational opportunities, and to use the gap in participation rates (rather than the actual numbers, respectively) between different groups as a separate headline indicator. For example, one may track the ratio of high school dropout proportions for Aboriginal and non-Aboriginal students; or boys versus girls. By doing so, the indicator would allow one to track to what extent changes in, for example, childcare and/or high school participation rates are (un)equally distributed in the population.

The recommendation of including a separate indicator for the gap(s) between minority groups and non-minority groups is not to suggest that it suffices to track the other indicators solely at an overall level. To the contrary, as has been suggested for other domains of the CIW, we recommend tracking educational outcome trajectories in a way that allows one to analyze the trends with respect to any sub-population of interest (for example, male students from rural backgrounds; girls versus boys with an English-as-a-Second-Language background; on-reserve versus off-reserve Aboriginal students).

2.5 Participation in education

The previous section illustrated that tracking of the socioeconomic gradient in education requires that everyone participates in a comparable type of education, and that the educational level or performance can be quantified along a dimension that gauges its quality (e.g., high versus low performance). This is meaningful in settings with universal participation, and with common standards, according to which everyone is assessed. A classic example, as discussed above, is the accomplishment of basic educational knowledge and skills, such as literacy and numeracy, in school. In post-secondary education, in apprenticeships, and in professional training, retraining, and development, however, quantification along a dimension of quality is neither always feasible, nor necessarily meaningful. For example, it would be difficult trying to compare carpenter training with a nursing degree in terms of their 'quality'. In light of the proposed lifespan approach to education, one needs to consider the options for identifying a meaningful indicator of education that captures education beyond post-secondary education, apprenticeships, and professional degrees/training.

One possibility is to approach this issue from a demand/need-and-supply perspective. It goes without saying that not all people aspire, require, and/or equally benefit from the same type or amount of education, and this is especially true with increasing age and/or increasing educational diversification and specialization. For example, people working in professions that are characterized by rapidly changing demands due to development of the field (e.g., technology-dependent professions) may continuously require additional professional training. Also, people who lose and/or intend to change their jobs typically require professional (re)training. As this is relatively new, uncharted terrain in terms of education indicators, it needs to be explored whether this concept could potentially be captured adequately by an indicator or a combination of indicators. Assuming that certain principles associated with socioeconomic gradients also hold in this scenario, the following ideas might be worth considering. First, one could simply explore the availability of data reflecting participation in professional development and retraining. Second, one could focus on a specific segment of the population, and track its participation in professional development or retraining. The rationale for proposing the second approach is based on the understanding that professional development and retraining is not, and maybe cannot be, systematically tracked in a way that allows for comparisons across groups and jurisdictions. However, certain portions of this concept might be realizable. For example, it is definitely desirable that people, who seek employment and the necessary qualification for it, have the opportunity to do so. In fact, it has been shown that people with high school completion or less benefit (economically) the most from participation in adult education and (re)training (Jenkins, Vignoles, Wolf, & Galindo-Rueda, 2003). Therefore, it could be proposed to use the proportion of people with high school completion or less, who are involved in retraining or further professional development as an indicator of access to specialized education that is need-based. This approach would, similar to the socioeconomic gradient in education, thus address this area of education from an equity perspective.

Up to this point, we have discussed the following aspects of education:

1. A lifespan development approach to learning, that encompasses:
 - Early childhood education;
 - K-16;
 - Post-secondary education apprenticeships, professional training; and
 - Adult learning.
2. Three general domains pertaining to content areas of education:
 - Social and emotional competences;
 - Basic educational knowledge and skills; and
 - Overall academic achievement, attainment, and participation.
3. Equity and equality in education;
4. The socioeconomic gradient; and
5. Participation in education.

In the last part of this section, we briefly address some concepts that have frequently been discussed as indicators of education. We provide the rationales for why these concepts (with one exception) are *not* recommended by us for inclusion in the Education domain, despite their popular use in some contexts. These concepts are:

- Informal learning and education
- Expenditures
- Teacher development, preparation, and support
- Class size and teacher-student ratio

What these four concepts have in common is that they are not indicators of outcomes in formal educational settings. Instead, informal learning is a concept that specifically addresses processes or outcomes that are related to informal settings, and the concepts of (i) expenditures, (ii) teacher development, preparation, and support, and (iii) class size and teacher-student ratio focus on the inputs and/or processes of formal educational settings, rather than the outcomes.

2.6 Formal versus informal learning and education

At this point in the discussion, it is necessary to address an issue that is potentially confusing and subject to disagreement. This issue has to do with the distinction between learning and education. Obviously, any definition of education implies that learning occurs. In other words, if a person is educated, she or he must have learned something. However, the reverse is not necessarily the case: Learning does not solely result from education *as defined in this context*. Learning can happen in any context, whereas the term education is confined to schooling,

instruction, and training in settings that are specifically arranged for this purpose. In other words, if a person has learned something, it does not follow that this person is educated. It is clear that measuring educational outcomes (e.g., a literacy test) cannot distinguish between whether the result is based on learning that occurred informally or in educational settings or both. Also, the proposed definition of education in this context does certainly not diminish or disregard the importance of informal learning—quite the contrary. In fact, it must be acknowledged that a healthy combination of informal and formal learning occurs in any community, supporting and complementing each other (Schliemann, 2000). The point that is relevant for this discussion, however, is that education is only one part that contributes to learning.

This argument is presented in order to facilitate a conceptual distinction between education and learning. Clearly, for the CIW, we recommend solely focusing on the education side, because it does not seem feasible to propose indicators that are supposed to *systematically* capture something *unsystematic*, such as informal education. We reiterate the point that this rationale does not devalue informal education. Rather, the argument here is that the objectives and purposes of formal education (e.g., problem solving, critical thinking, social responsibility) are, in fact, often similar to objectives and purposes of informal learning. Therefore, those overlapping objectives and purposes will be captured by a comprehensive set of indicators regardless of whether it is aimed at informal learning or educational settings.

2.7 The challenge of linking inputs, processes, and outcomes in education

The introduction to this last section of the theoretical framework briefly touched upon the differentiation between inputs, processes, and outcomes of education. In the following, we delineate the complexities and unresolved challenges with regard to establishing clear connections between inputs, processes, and outcomes in education. Also, we provide a rationale for why we advise against including an expenditure headline indicator in the Education domain. The reason this issue is given particular attention is based on the fact that expenditures, inputs, processes, and outcomes in education are frequently discussed jointly in policy debates as well as in research on education.

So far, the report has almost exclusively advocated outcome indicators, with the exception of the availability of childcare spaces, which may be considered, by some, an input indicator. In this regard, it is, however, important to point out that the language of “input” implies that we know the connections to “outcomes”. However, this issue is highly controversial. In fact, the reason for not giving more weight to input or process indicators in our selection of indicators for the Education domain is that input indicators do not appear to have a simple, direct relationship to outcomes indicators (Barber & Mourshed 2007; Hanushek & Rivkin, 2004; Organisation for Economic Co-operation and Development, 2007), but a complex one. It is, for example, possible, that many financial resources are put into an educational system, but that the educational process is not necessarily enhanced by it, or that these resource inputs do not have an effect on educational outcome (Barber & Mourshed 2007; Hanushek & Rivkin, 2004; Organisation for Economic Co-operation and Development, 2007). Accordingly, it remains an

open question to what extent indicators of input and process could be valid indicators of education. An answer to this question evidently depends on the focus of one's interests. In terms of the CIW, it thus helps to revisit a number of its stated purposes before addressing this question in some more detail in the next sections.

Two purposes of the CIW are of particular relevance in this regard. First, the CIW intends to track progress. With regard to this purpose, it might be sufficient to solely track educational outcomes. A further purpose of the CIW, however, is to promote a debate and understanding. For this purpose, obtaining information about educational inputs or processes that are found to be systematically related to educational outcomes would be invaluable. After all, such understanding would provide much more applicable information, since educational inputs and processes are, in contrast to educational outcomes, matters that can in some cases be influenced directly, by changes in educational practice and policy making. In light of this argument, the next section briefly reviews issues pertaining to expenditures, teacher preparation and support, and class size.

2.7.1 Expenditures

Expenditures on education have consistently been used as indicators for examining local, national, and international trends and comparisons (Organisation for Economic Co-operation and Development, 2007). The basic rationale for doing so is that (relative or absolute) spending (e.g., per pupil expenditures, proportion of GDP) is conceived of as a reflection of societal priorities. In this context, the question becomes whether expenditures can also be used meaningfully as indicators of education. The answer to this question is not straightforward and therefore a matter of some controversy. The reason for this is that expenditures on education are not directly, but only indirectly related to the actual educational process. For example, large expenditures for the administrative apparatus of an education system might have little effect on practices in the classroom; or investments in educational facilities might solely benefit a small proportion of learners. In line with this argument are findings that show only small or moderate correlations between expenditures on education and other indicators of education, such as academic achievement, completion rates, participation rates, and so forth (Organisation for Economic Co-operation and Development, 2007). More telling than *how much* is spent on education is, therefore, *how* resources are spent in education. With respect to this point, two studies are of particular interest.

The first study was conducted by the Office of the Parliamentary Budget Officer (2009) with the objective to assess funding equity between on-reserve First Nation schools and schools in the public school system. The study uncovered drastic under-funding of on-reserve First Nation schools, reflecting the Canadian government's failure to provide on-reserve education system funds that are at comparable levels to the funds provided to the public school system (see also Stewart, 2006). Due to the changes in legislation with regard to self-governance and sovereignty over the education system in First Nations schools over the past decades (*ibid.*), it appears to be impossible to find indicators that would allow one to retrace the funding inequities over the past decades. We therefore very strongly emphasize the current existence of this gap, and

stress even more the importance of examining, in the future, to what extent remaining funding gaps are associated with any inequalities in educational outcomes.

The second study was conducted by Barber and Mourshed (2007), which aimed to identify the common characteristics of educational systems that are consistently doing well according to international comparisons of academic achievement. The report identified three characteristics, two of which we address here: (i) Teacher development, preparation, and support, and (ii) providing children with learning opportunities and time on task. These characteristics are discussed in the next sections.

2.7.2 Teacher development, preparation, and support

Validating Bismarck's maxim that any system can only be as good as the people running it, the study by Barber and Mourshed (2007) on the effectiveness of educational systems found that teacher selection and preparation contribute significantly to the overall functioning of the educational process. Supporting these findings is a large body of research that concludes that teachers—not too surprisingly—can make a significant difference with regard to students' learning (Hanushek & Rivkin, 2004; Hopkins & Stern, 1996). The question is what differentiates effective teachers and effective teaching from ineffective teachers and teaching? Right away, it must be stressed that the answer to this question is: It depends. After all, there is no prototype of the ideal teacher due to the complexity of the interactions between teacher, teaching, student, and context characteristics that affect educational outcomes (Hanushek & Rivkin, 2004; Hopkins & Stern, 1996; Wayne & Youngs, 2003).

This fact notwithstanding, there might be some system level differences that are related to teacher and teaching effectiveness at a group level. According to Barber and Mourshed (2007), well-performing educational systems were characterized by a selective, highly organized, high-level of initial teacher preparation, and a high degree of teacher support in schools. In addition, in those systems, the teacher preparation and support is aligned with the learning mandates of the school system. As obvious as this latter point is conceptually, a disconnect between teacher preparation and support does easily occur in practice, due to multiple factors. For example, teachers who were trained at a time when the focus was on teaching literacy might feel inadequately prepared at a later time when asked to teach social responsibility.

Given the complexity and context- and time-dependent nature of this issue, the conclusion with regard to the CIW is that this issue is not to be dealt with by indicators. In fact, in our view, it would most likely be counterproductive for the following reason. An indicator, as defined by the acceptability criteria by Michalos et al. (2010), should allow for comparison across groups and jurisdictions. By definition, this becomes the more difficult the more context-dependent the construct is that an indicator is supposed to represent. To some degree, this is true for all constructs in the social sciences; but with regard to assessing teacher preparation and support, this seems to be especially so, as illustrated by the examples in this paragraph. Given this state of affairs, we refrained from recommending any indicators that purport to get at the construct of teacher preparation, or teacher support, and stay away from the notion of teacher quality, due to its political connotations.

2.7.3 Class size and student-educator ratio

Class size and student-educator ratio is another widely addressed indicator of educational expenditures or the educational process (Finn & Achilles, 1990; 1999; Hanushek & Rivkin, 2004; Mosteller, 1995; Nye, Hedges, & Konstantopolous, 1999, 2000, 2002). It is an indicator of expenditures insofar as it provides a sense of how much resources are actually dedicated toward teaching staff—which is arguably the most important asset of any educational setting. To some degree it may also be considered an indicator of educational process, because studies have found that smaller teacher-student ratios allow for more individual student-teacher interaction and facilitate relationship building, both of which have, in turn, been found to be beneficial for the educational process and outcomes (Mosteller, 1995), as they provide better opportunities for students to focus on the learning task.

The most important findings in this regard stem from the Tennessee class size experiment and similar large scale studies, consistently showing that small class sizes (of 13-17 students) during the first few years of school (Kindergarten through Grade 4) have positive effects of significant magnitude and duration on children’s developmental and educational outcomes, and this effect is particularly pronounced for children from disadvantaged minority backgrounds (Finn & Achilles, 1990; 1999; Mosteller, 1995; Nye et al., 1999, 2000, and 2002). The finding has been corroborated by research on early childcare. It has been shown that high quality childcare has significant positive effects on children’s developmental and educational outcomes, if the childcare setting fulfils certain quality criteria—and one of these quality criteria is small group size and high staff/teacher to child ratio. Again, the positive effects of high quality childcare are especially pronounced for children from disadvantaged minority backgrounds (Doherty, Lero, Goelman, LaGrange, & Tougas, 2000; Goelman et al., 2006).

Based on these consistent research findings, we chose to include the student-educator ratio as one of the indicators (see details below).

In this section, we discussed the issues of inputs, processes, outcomes, expenditures, teacher preparation and selection, and class size and student-educator ratio. Based on our interpretation of the research literature, we chose to include the student-educator ratio in public schools as a headline indicator in the Education domain. At the same time, we advised against including an overall expenditure indicator. We would like to conclude this section by saying that this exclusion of an expenditure indicator has been done after much discussion, and also with much deliberation. As was stated above, under-funding and a lack of resources have been found to be a critical issue for on-reserve First Nation schools. Likewise, severe under-funding of any school system will almost certainly be associated with declines in educational outcomes in the long run. The importance of adequate funding for the school system is therefore not questioned. At the same time, providing sufficient resources (including expenditures) is solely one of several necessary, but not sufficient conditions for a functioning education system. As a consequence, including expenditures as an indicator for education would showcase one out of many important aspects of an education system. In the past, this practice has led to a situation in which education is framed as an issue of ‘efficiency’ and/or of a

‘cost-benefit’ ratio. Such framing would, however, be counterproductive to the purposes of the CIW, as the CIW intends to holistically promote awareness about societal issues. The decision not to include an expenditure indicator is in line with that of Berliner (1995), who shows that the expectation that fixing our schools (with money) will fix inequities in our society is unreasonable. Furthermore—and more importantly—the expectation that schools alone can solve societal issues (e.g., inequity, poverty) carries, in fact, the risk of putting all responsibility as well as potential blame on a system that, by itself, should not and cannot be held accountable for such tasks.

The CIW has, of course, been designed with the purposes to track progress, to promote awareness, and to stimulate debate. As a result of the discussion on expenditures as well as on the relationship between inputs and outcomes, we would therefore like to conclude this section with an idea for the CIW at large. This idea is aimed at framing the question about expenditures not individually within the CIW’s respective domains. Rather, it might be very effective to track government expenditures with regard to education, health, social welfare, housing, and environmental issues jointly, and in comparison to government spending (e.g., subsidies, tax subsidies) on other sectors, such as agriculture, transport, or defense. In fact, it might be of interest to develop a tracking system that plots the expenditures for the eight CIW domains against each other as well as in comparison to domains that are not (directly) included in the CIW, but which rely on government spending (e.g., transportation infrastructure). If such pie chart that tracks government funding over time were to complement the CIW as a whole—rather than tracking individual domains of the CIW separately—the public discussion about our collective responsibilities and civic duties might be substantially promoted and re-framed at a broader, more meaningful societal level.

3. Validation of our framework: An expert consultation

In this section, we present the subject matter expert consultation that we conducted in order to validate our (developing) framework, to validate our preliminary choices of education indicators, and to obtain further recommendations for education indicators. The consultation was conducted in the months of June and July of 2008, parallel to the preparation of the theoretical framework presented in the first part of this report, and parallel to the review of the education indicator literature. In the following, we delineate the process and the results of the expert consultation.

3.1 Process

Given the nature, scope, complexity, and importance of the task of identifying indicators for the education domain of the CIW, the expert validation was intended to provide answers in response to the following questions:

- Do subject matter experts independently recommend domains and indicators that are part of our theoretical framework, thus validating it?
- Do subject matter experts independently recommend domains and indicators that are not part of our theoretical framework, thus implying that we are missing important aspects?
- Are there indicators and domains about which there is a certain degree of consensus among the experts?
- Are there specific data sources for indicators suitable for our theoretical framework of which we are unaware?

3.2 Phase I

The expert consultation was conducted in two phases. In the first phase, a group of 40 education professionals (teachers, youth and family workers, and after-school program coordinators in the K-12 system) was (verbally) asked to choose three domains, indicators, or measures to reflect how educated the Canadian people are with respect to maintaining and improving the collective wellbeing of Canadian society, during a professional group meeting, and asked to provide a written answer (see Appendix 1).

3.2.1 Results Phase I

The response rate was 90% (36 out of 40). The responses were all transcribed and then categorized into domains based on their similarity. In the following table, we list the domains, which were suggested at least 3 times:

- Tolerance, respect, acceptance and awareness of multiple cultures (21)
- Social and emotional competences, empathy, managing own emotions (13)

- Interest in and skills for reading/literacy (13)
- Volunteering, community involvement (12)
- Motivation and skills for life-long learning (12)
- Physical and mental health and wellbeing (10)
- Critical thinking and problem solving skills (9)
- Knowledge (in different subject areas) and academic achievement (9)
- Numeracy (7)

3.2.1 Discussion of results Phase 1

The responses of the education professionals need to be interpreted in light of the fact that they all work in a socio-economically and culturally diverse (sub)urban K-12 school environment. Accordingly, issues of particular relevance to early childhood education as well as education beyond high school might be underrepresented. Also, this scenario might have caused a certain bias toward issues that are, potentially, of particular relevance in a (sub)urban, multicultural environment. With this caution in mind, the results provide a number of invaluable insights.

First, the related constructs of tolerance, respect, acceptance and awareness of multiple cultures, as well as social and emotional competences, empathy, managing own emotions were mentioned most frequently, namely 34 times. Second, constructs that are typically subsumed under the domain basic educational knowledge and skills (literacy, numeracy, problem solving, and critical thinking) were mentioned the second most, 29 times. Third, the construct of life-long learning was mentioned by one third (12) of the respondents, and fourth, academic achievement was mentioned 9 times.

These responses thus clearly validate the educational domains proposed in our framework (social and emotional competences, basic educational knowledge and skills, and overall academic achievement, attainment, and participation) as well as our lifespan perspective on education. The remaining most cited constructs—volunteering and community involvement, physical and mental health and wellbeing—are, as we understand it, covered in sufficient detail by the community vitality and health domains, respectively, of the CIW.

3.3 Phase 2

In Phase 2, we contacted 40 education researchers (university professors, program evaluators, research analysts) across Canada, from a variety of sub-disciplines in education, in order to tap into a wide range of perspectives and insights. This phase was conducted via email. In the email, we asked participants, as in Phase 1, to choose three indicators or measures to reflect how educated the Canadian people are with respect to maintaining and improving the collective wellbeing of Canadian society. In addition, we explicitly asked participants to include suggestions for specific existing measures or data sources, as well as for developing new, not yet existing ones (see Appendix 2 for the full email).

3.3.1 Results Phase 2

The response rate among the education researchers was 55% (22 out of 40). Five of the responses could not be used for our analysis, because they did not address our question. (We are not sure to what extent that reflects the ambiguity of the wording of the question or the nature of email communication in academia.) Therefore, our actual sample was 17 (42.5%). The following list provides the frequencies with which certain indicators and domains were recommended. Here, single mentions are also included in the list, due to (i) the smaller sample and the lower response rate (7 out of 17 respondents solely recommended/knew of 1 or 2 indicators), and (ii) the greater heterogeneity of the respondents' areas of expertise. In addition, for each domain, respectively, the recommendations (if provided) for specific data sources for the indicators are shown.

- Reading, literacy (8)
 - PISA
- School readiness/early years (6)
 - EDI
- Numeracy, mathematics (5)
 - PISA; TIMMS
- Highest level of education (4)
 - Labour Force Survey
- High school completion rates, drop-out (4)
 - Labour Force Survey
- Life-long learning, retraining (4)
 - Survey of Income and Labour; UNESCO Institute of Statistics
- Social and emotional competences (4)
 - Middle-Years Development Instrument; Ministry's School Satisfaction Survey's
- Participation in post-secondary education (2)
 - Survey of Income and Labour
- Early childhood education (2)
 - Early Childhood Environment Rating Scale
- Inequality (1)
- Community involvement, volunteering (1)
- Music involvement (1)
- Expenditures for fine arts (1)

3.3.2 Discussion of results Phase 2

Like Phase I, the consultation process provided interesting insights. The wording of the question—"... how educated the Canadian people are with respect to maintaining and improving the collective wellbeing ..."—implied that there is a causal, functional relationship between education and 'maintaining and improving wellbeing'. Judging by the responses we received, the question was interpreted in quite different ways. In a couple of cases, the entire approach of the CIW project was questioned; in others, it was not understood, leading to

unusable answers; in yet others, interesting—but impractical to the purpose—theoretical considerations and suggestions were shared.

This being said, the responses that recommended very specific domains or constructs (e.g., high school completion rates) as well as specific indicators (e.g., PISA), in our view, corroborated the results from Phase 1 in that they frequently included similar constructs (e.g., basic educational knowledge and skills, such as literacy and numeracy; social and emotional competences). In addition, the responses also covered the entire spectrum of the lifespan approach to education, insofar as early childhood education indicators, K-16 education indicators, and adult education indicators were recommended. Therefore, the results of Phase 2 also validated the part of our framework pertaining to these constructs. In addition to validating the proposed theoretical framework and its domains, Phase 2 particularly helped to identify specific indicators, which were considered valid by experts in the field, for the respective domains.

Phase 2 of the expert consultation also showed the existence of some gaps with regard to available indicators. For example, social responsibility or social and emotional competences, were suggested as indicators of education—however, the suggested measures (e.g., Middle-Years Development Instrument; School Satisfaction Survey data) do not yet provide sufficient data to fully pass the acceptability criteria set forth by Michalos et al. (2010). This, of course, does not mean that there simply is no appropriate indicator for the domain—however, it indicates that those are either not as prominent and widely known as the more traditionally used indicators for constructs such as academic achievement, or that the existing ones are not considered valid or representative (cf. Hayward et al., 2007).

Finally, a couple of constructs that were not mentioned in Phase 1, but in Phase 2 of the expert consultation—and which are addressed in our discussion above—are inequality (discussed in the section on socioeconomic gradients and equity) and expenditures (in fact, expenditures on music education). The small sample size, and the fact that we solely asked for three indicators certainly had an effect on how many constructs apart from the ‘most important’ ones could be mentioned. Being aware that the consultation was, in that regard, not fully representative, it may only be acknowledged that every headliner we proposed in our framework was mentioned at least once in the responses. In turn, it must be acknowledged that the expert consultation, as it occurred in parallel to our review and writing process, might have influenced the focus of that process.

4. Headliners and Indicators

In light of the presented theoretical framework and the expert consultation, the strategy for choosing eight headliners for the education domain and the respective indicators became straightforward in principle—and difficult in regard to detail. The priority was to have the headliners and respective indicators represent the theoretical framework as comprehensively as possible. This meant that the headliners and respective indicators would, ideally, (i) reflect a lifespan approach to education, covering the range from early childhood education to adult education, (ii) cover the proposed educational domains of social and emotional competences, basic educational knowledge and skills, and overall educational achievement, attainment, and participation, and (iii) address issues of equity and equality.

The second most important objective was that the headliners and indicators needed to be composed of a blend of traditional, conventional education indicators and less traditional, unconventional indicators. This objective grew out of the impression that conventional indicators of education (such as achievement and attainment scores) by themselves represent a relatively narrow definition of education (cf. Delors et al., 1996). We believe that such a narrow definition of education is not representative of the common public view on education today (cf. Doherty, 1997; Gardner, 2004; Izard, 2002; Izard et al., 2004; Sternberg & Grigorenko, 2005; Wentzel, Barry, & Caldwell, 2004; Zigler & Bishop-Josef, 2006), and certainly not representative of the view of educators and education researchers, as our expert consultation confirmed.

The main reasons for such indicators to have become the conventional, traditional ones can probably be traced back to measurement issues and to semantic inconsistency. That is, measuring a narrow, specific skill such as numeracy, for example, is easier and typically more reliable (in the psychometric sense) than measuring a more abstract, broad construct such as social competence. In addition, education is, semantically, often equated with schooling; and even though schooling is not confined to academic skills, and even though it is typically acknowledged that social and emotional competences are characteristic of a ‘good education’, specific academic skills are almost exclusively taught in school, whereas social and emotional competences are modeled in numerous other contexts. Thus, academic achievement is a uniquely defining characteristic of schools, whereas social and emotional competences are not. Therefore, the inclusion of indicators for social and emotional competences is not unconventional with regard to the underlying rationale, but rather with respect to previous measurement practices and a semantically narrow, simplified usage of the term education.

Based on this strategy, the following eight headliners were chosen, representing all aspects of our theoretical framework:

1. Early childhood education and care;
2. Transition to school: Developmental health in kindergarten;
3. Student-educator ratio in public schools;
4. Social and emotional competences in middle childhood;
5. Basic educational knowledge and skills of youth;
6. Equality in education: The socioeconomic gradient;

7. High school completion; and
8. Participation and attainment in post-secondary education.

4.1 Rationales for each respective headliner

1. Early childhood education and care

Early childhood education and care is included as one of the headliners to represent the early years, that is, the years before school (K-12). Its inclusion acknowledges a vast amount of research showing the developmental importance of the early years with respect to not only education, but also health (Keating & Hertzman, 1999; Shonkoff, 2000). Also, the inclusion of early childhood education is intended to promote a lifespan development perspective on education (Audas & Willms, 2001; Baltes & Smith, 2004; Baltes et al., 2006), rather than reinforcing the political-institutional separation of developmental and educational matters pertaining to the early years (0-5 years of age) and educational matters pertaining to the K-12 system (5-17 years).

2. Transition to school: Developmental health in kindergarten

Transition to school: Developmental health in kindergarten is included among the headliners, as the construct reflects developmental outcomes of the early years (Doherty, 1997; Keating & Hertzman, 1999; Shonkoff, 2000), marks a developmentally crucial transition (Entwisle & Alexander, 1993), and has been shown to be predictive of further educational outcomes (Duncan et al., 2007; Schweinhart & Weikart, 1997). Tracking early childhood education data has the potential to provide invaluable information for the purposes of community planning and policy making for early childhood education and elementary school practices; an issue that has, in recent years, increasingly attracted political awareness (Kershaw, Irwin, Trafford, & Hertzman, 2005; Mustard & McCain, 1999).

3. Student-educator ratio in public schools

This indicator provides a sense of how much resources are actually dedicated toward teaching staff—which is arguably the most important asset of any educational setting. To some degree it may also be considered an indicator of educational process, because studies have found that smaller teacher-student ratios allow for more individual student-teacher interaction and facilitate relationship building, both of which have, in turn, been found to be beneficial for the educational process and outcomes (Mosteller, 1995), as they provide better opportunities for students to focus on the learning task.

The purpose here is to include a measure that is sensitive to differences (over time or across jurisdictions) with regard to one of the most critical assets of education: educators. This indicator also allows one to gauge to what degree our society invests in this most fundamental aspect of the education system.

4. Social and emotional competences in middle childhood

The domain of social and emotional competences in middle childhood (age 6-12; e.g., Collins, 1984) has been included for two reasons. First, high social and emotional competences are valued as desirable characteristics of an (educated) person in their own right (Wentzel et al., 2004; Zigler & Bishop-Josef, 2006). Second, social and emotional competences have been found to be related to the development of competences in other domains, such as academic achievement (Caprara et al., 2000; Wentzel, 1991; Zigler & Bishop-Josef, 2006), physical and mental wellbeing, social support, health, and job success (Mayer et al., 2008; Schweinhart & Weikart, 1997).

5. Basic educational knowledge and skills of youth

Basic educational knowledge and skills, such as literacy, numeracy, science and problem solving skills, and critical thinking, have been widely used outcome measures for national and international comparisons of education systems (Organisation for Economic Co-operation and Development, 2007). Theoretically and empirically, this practice has continuously been validated and refined over the past (Willms, 2006). Most importantly, these skills are, for obvious reasons, fundamental for access to further education in our society.

6. Equality in education: The socioeconomic gradient

Given the subtle, but important differentiation between equity and equality, two separate headlines were chosen for these themes. The socio-economic gradient as an indicator of equality is included as one of the headlines to draw attention to the relative distribution of educational *outcomes* within society. The purpose is to include a measure that is sensitive to the systematic exclusion or disadvantage of particular groups (e.g., minority groups, low socioeconomic status groups) within the population (Willms, 1999; Zigler & Styfco, 2008).

7. High school completion

High school completion, or its inverse, high school dropout, has also been used traditionally as an indicator of education. It may not be quite as fundamental as basic educational knowledge and skills in terms of access to further education, but is not far behind, as it is a formal prerequisite for college education and (most) professional training. Accordingly, high school completion is highly related to unemployment and, consequently, predictive of later socioeconomic status and health outcomes (Organisation for Economic Co-operation and Development, 2007).

8. Participation and attainment in post-secondary education

An increasingly knowledge-based economy (Jenkins et al., 2003; Thiessen, 2001) demands that employees reach increasingly high levels of education. Given that involvement in societally valued (i.e., paid or volunteer) work is related to desirable social, psychological, and financial outcomes (e.g., social network, self-esteem, contribution to society, income), the role of post-secondary education for involvement in the work force and society has therefore become increasingly important (Jenkins et al., 2003; Thiessen, 2001). Given the diversity of educational specializations, it appears to be more adequate to track participation

in and completion of an educational process, training, or degree at the post-secondary level—rather than trying to assess specific skills or knowledge.

4.2 The indicators for the headliners

The choice of indicators for the eight headliners was, in part, delimited by the availability of Pan-Canadian trend data. Fortunately, due to invaluable work of Statistics Canada and several other national and international large-scale initiatives (e.g., the National Longitudinal Study of Children and Youth/NLSCY; the Programme for International Student Assessment/PISA; Early Childhood Education and Care in Canada), a substantial variety of education indicators is available for the Pan-Canadian context. This is not to say that the existing indicators are without room for improvement (e.g., representative coverage of all sub-populations of Canadian society). In fact, some of the indicators might significantly benefit from current efforts to develop Pan-Canadian indicators of children’s developmental health (e.g., the early Development Instrument/EDI; Kershaw, Irwin, Trafford, & Hertzman, 2005). In the future, indicators derived from those currently evolving initiatives and projects will greatly enhance and complement the current set of the chosen eight headliners for the Education domain.

Table 7 provides a quick reference to the eight headline indicators, their respective measures and data sources, as well as their past and (assumed) future availability. (Table 7 is based on the CIW’s generic template for CIW domain headline indicators.)

Table 7. Headline Indicator table

Headline Indicator	Data Source	Frequency of Reporting	Years for which Headline Indicator has Data																
			94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
Early childhood education and care	Early Childhood Education and Care in Canada (www.childcarecanada.org/)	Every 3 years/ bi-annual		x			x			x			x		x		x	(x) ¹	
Transition to school: Developmental health in kindergarten	NLSCY (kindergarten age) (www.statcan.ca) (EDI) ²	Bi-annual	x		x		x		x		x		x		x		(x) ¹	(x) ¹	
Student-educator ratio	Student-educator ratio (www.ccl-cca.ca ; www.statcan.gc.ca)	Annual				x	x	x	x	x	x	x	x	x	x	x	(x) ¹	(x) ¹	(x) ¹
Social and emotional competences in middle childhood	NLSCY (12-13 year olds) (www.statcan.ca); (MDI) ³	Bi-annual			x		x		x		x		x		x		(x) ¹	(x) ¹	
Basic educational knowledge and skills	TIMSS (www.nces.ed.gov/timss)	Every 4 years		x				x				x				x			
	PISA (www.pisa.gc.ca/)	Every 3 years							x			x			x		(x) ¹		
Equality: Socio-economic gradient	OECD/PISA (www.pisa.oecd.org)	Every 3 years							x			x			x		(x) ¹	(x) ¹	
	Survey of Labour & Income Dynamics(www.statcan.ca)	Annual							x	x	x	x	x	x	x	x	(x) ¹	(x) ¹	(x) ¹
High school completion	Labour Force Survey (www.statcan.ca)	Annual/monthly	x	x	x	x	x	x	x	x	x	x	x	x	x	x	(x) ¹	(x) ¹	(x) ¹
Post-secondary education	Labour Force Survey (www.statcan.ca)	Annual/monthly	x	x	x	x	x	x	x	x	x	x	x	x	x	x	(x) ¹	(x) ¹	

¹Data for these years (indicated by (x)) are anticipated, but not yet public or not yet available.

² Data for the EDI are not yet Pan-Canadian. Full provincial implementations in: BC, Ontario, Manitoba, (Alberta, Saskatchewan, PEI); Partial provincial implementation: Quebec, New Brunswick, Nova Scotia, Newfoundland. We recommend complementing NLSCY data with EDI data in the future.

³ The Middle-Years Development Instrument (MDI) self-report survey is currently in its implementation phase, and we recommend complementing National Longitudinal Survey of Children and Youth data with MDI data in the future.

4.3 Description of measures, data sources, availability, and comments⁵

I. Early childhood education and care

- Number of available early childhood education and care places (for age 0-5)

Measures and data sources

- Early Childhood Education and Care in Canada (Friendly & Beach, 2005)
- www.childcarecanada.org/

Comments

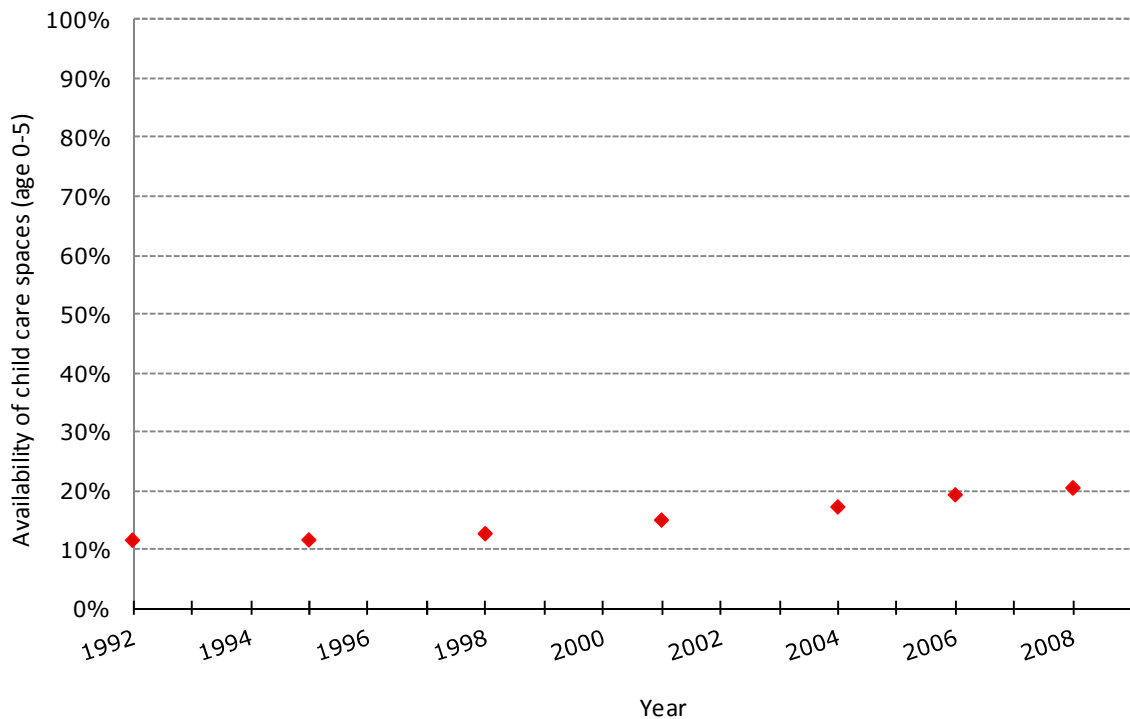
Data on the number of childcare and early childhood education spaces divided by the number of children who are 0-5 years old are available from the bi-annual report 'Early Childhood Education and Care in Canada' (Friendly & Beach, 2005). This percentage indicator is not an absolute, but a relative one: Theoretically, it is possible that an indicator improves even if the number of spaces declines, if the number of children 0-5 years old decreases at a greater rate than the number of available spaces. Also, the number of spaces may be affected (or manipulated) by an increase in group-size and/or decrease in the staff-child ratio. In order to track whether group size and/or staff-child ratios are systematically and significantly affecting the spaces per children percentages, it should periodically be examined whether maximum group sizes and minimum staff-child ratios change over time.

We must note that this indicator has been selected with some reservations, as the effects of child care and early childhood education has been a matter of debate in the research literature (Belsky, 1988). In recent years, the field has come to a more conclusive view, and the essence of the current debate can be summarized in the following statement: Child care and/or early childhood education (e.g., a pre-school program) have, on average, positive effects on children's social, emotional, and academic development *if* it is high quality (Doherty et al., 2000; Goelman et al., 2006)—so that research now centers around the question of what constitutes 'quality' in early childhood education (Bredekamp & Copple, 1997). In Canada, as well as in the US, a widely used measure to assess the quality of an early childhood education environment is the Early Childhood Environment Rating Scale (ECERS), a multi-item observational survey. Pan-Canadian data are not yet (fully) available for the ECERS—even though a national study (Doherty et al., 2000) covered numerous early childhood education sites across Canada. Since several provinces use the ECERS as a licensing measure, it may be expected that the use of the measure, and availability of data, will increase. Our recommendation is thus to complement, in the future, the data on the availability of early childhood spaces with data on the quality of these spaces. Eventually, this headliner might thus be represented by the number of high quality early childhood education spaces per number of children aged 0-5 years.

⁵ Appendix 3 provides a summary of the data that are currently available. In addition, it provides the links to websites on which the data and further resources can be accessed.

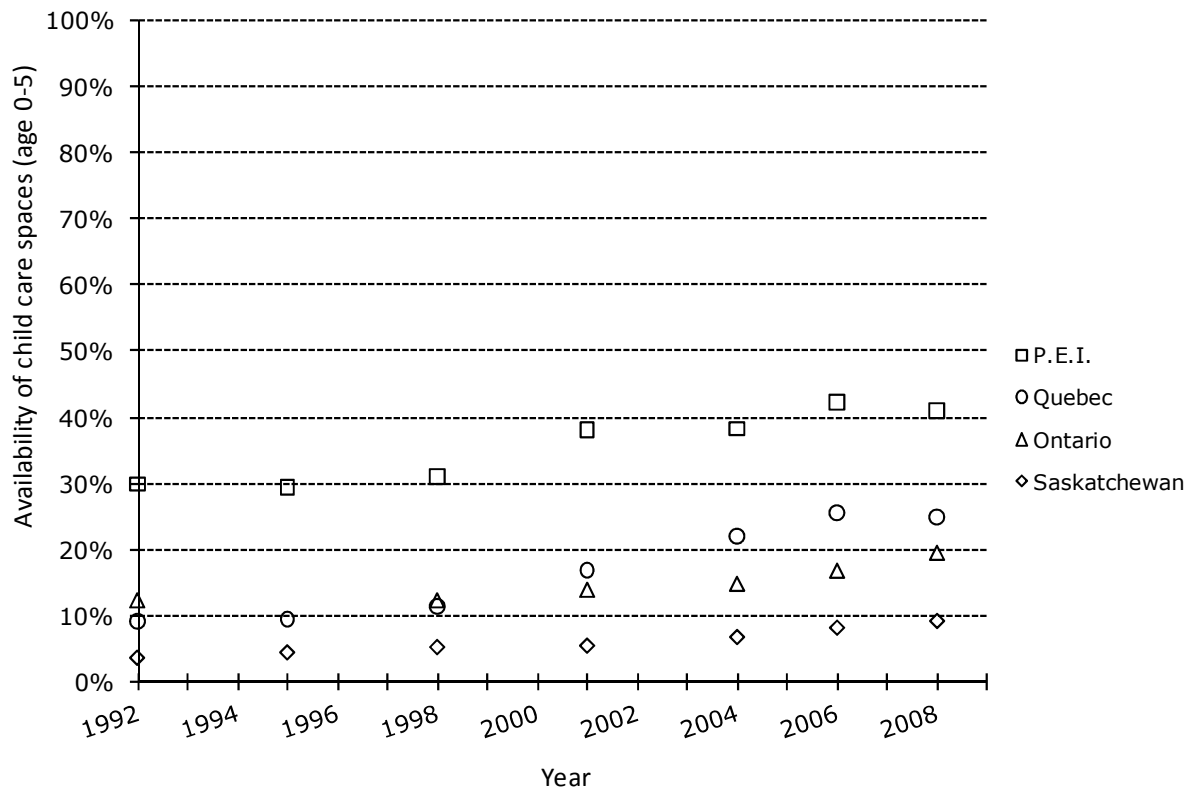
Figure 1a presents the trend for the ratio between the number of available childcare spaces and the number of all children aged 0-5 years, as a percentage. (See Appendix 3 to obtain actual percentages.) As can be seen, over the last two decades, availability of childcare spaces increased, but there is substantial variability among provinces (as can be seen in Figure 1b). The Pan-Canadian average percentage numbers thus hide a large degree of variability.

Figure 1a. Early Childhood Education and Care indicator: Availability of childcare spaces in Canada in percent. The percentages refer to proportion of children aged 0-5 years who had (access to) a childcare space in a given year.



Source: Childcare Canada, (Childcare Resource and Research Unit)

Figure 1b: Early Childhood Education and Care indicator: Availability of childcare spaces for selected provinces (Prince Edward Island, Quebec, Ontario, and Saskatchewan) in percent. The percentages refer to proportion of children aged 0-5 years who had (access to) a childcare space in a given year.



Source: Childcare Canada, (Childcare Resource and Research Unit)

2. Transition to school: Developmental health in kindergarten

- Children’s developmental health in kindergarten (at age 5) in five domains (physical health, social relationships, emotional wellbeing, cognitive skills (vocabulary), contextual factors (parental reading))
 - The indicator for this headliner is the composite (i.e., average) of the five domain scores
 - The mean scores of the five respective domains are provided to provide more detailed background information to facilitate the interpretation of the composite headline indicator
 -

Measures and data sources

- National Longitudinal Study of Children and Youth (NLSCY), Cycle 1-7 (Statistics Canada)

- www.statcan.ca

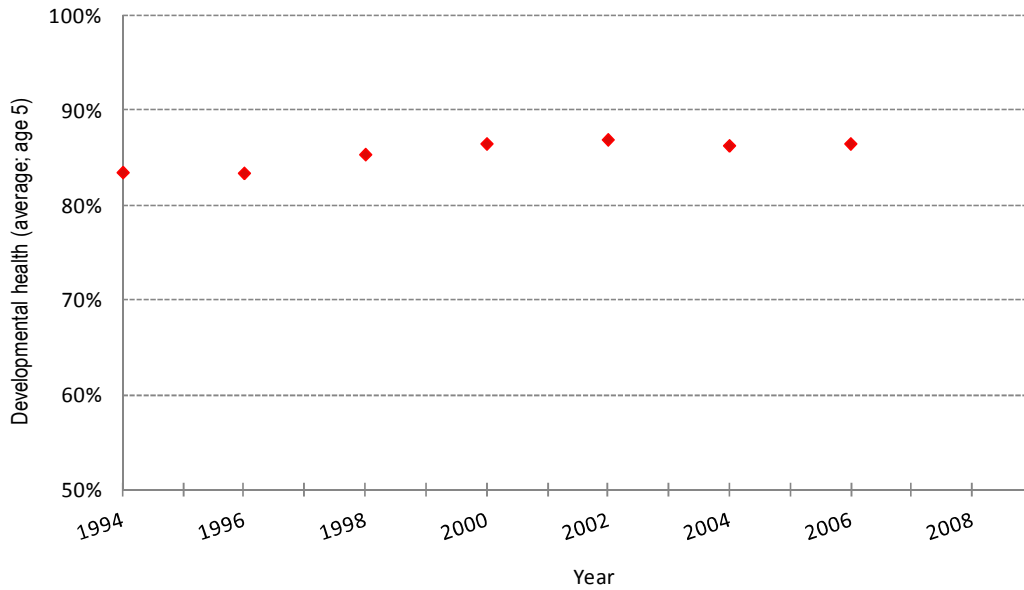
Comments

Data on children's developmental health in kindergarten (age 5) are available from teacher and parent reports in the National Longitudinal Study of Children and Youth (NLSCY) by Statistics Canada. For the CIW headliner, we have chosen to include data from items in the NLSCY questionnaires that represent five developmental domains of children's developmental health: the percentage of children who are rated as having good overall physical health; the percentage of children who have positive social relationships to peers and caregivers; the percentage of children who do not have emotional problems (e.g., anxiety); the percentage of children who have age-appropriate vocabulary skills; and the percentage of children whose parents read to them daily (to reflect a parenting/contextual factor that is considered important for children's developmental health). These five developmental domains—or slight variations of them—have repeatedly been widely acknowledged as key domains for a holistic view on children's developmental health (Doherty, 1997). Also, five developmental domains with similar content are rated on the Early Development Instrument (EDI, Janus & Offord, 2007; Kershaw et al., 2005), a teacher-administered community tool that is currently used at a population level in several Canadian provinces and jurisdictions. In fact, many of the items on the EDI are equivalent to items on the questionnaires from the NLSCY. The significant advantage of the EDI over the NLSCY is that the EDI has been administered at near-census levels in places where it has been implemented, whereas the NLSCY data represent a subsample of the population, which is representative for Canada as a whole, but does not allow for conducting analyses for smaller subgroups of children within Canadian society (e.g., different language groups). Accordingly, the CIW will, in the near future, benefit from the availability of EDI data at a Pan-Canadian level that will allow for conducting more refined analyses. We therefore recommend complementing NLSCY data used for this indicator with EDI data in the future.

Figure 2a shows the Pan-Canadian average of the percentage rates of kindergarten children (age 5) doing well with regard to five developmental health domains: Physical health; Social relationships; Emotional wellbeing; Vocabulary; Parental reading. As can be seen, the percentage rate slightly increases during the 1990 and stays level during the 2000s. (See Appendix 3 to obtain actual percentages.) The percentage rates for the individual developmental domains are shown in Figure 2b. The trajectories of the individual domains shown in Figure 2b all mirror the trend of the average trajectory in Figure 2a. The percentage rates of 'children doing well' on a given developmental domain are determined according to cut-off scores that have been set for the NLSCY study, according to clinical and developmental criteria. That is, if a child's score falls below the cut-off of a given domain, the child is considered to be vulnerable in that domain. Due to the conceptual and psychometric complexities of establishing reliable and valid cut-off scores for developmental teacher report data, slight fluctuations in vulnerability rates for small sample sizes may not easily be interpreted. However, the fact that the NLSCY data show a consistently increasing trend over one decade (1990s) and a consistent plateau during the following decade (2000s) for a representative Canadian sample of children raises important questions about the social and political changes that have gone hand in hand with this pattern.

Figure 2a: Transition to school: Developmental health in kindergarten

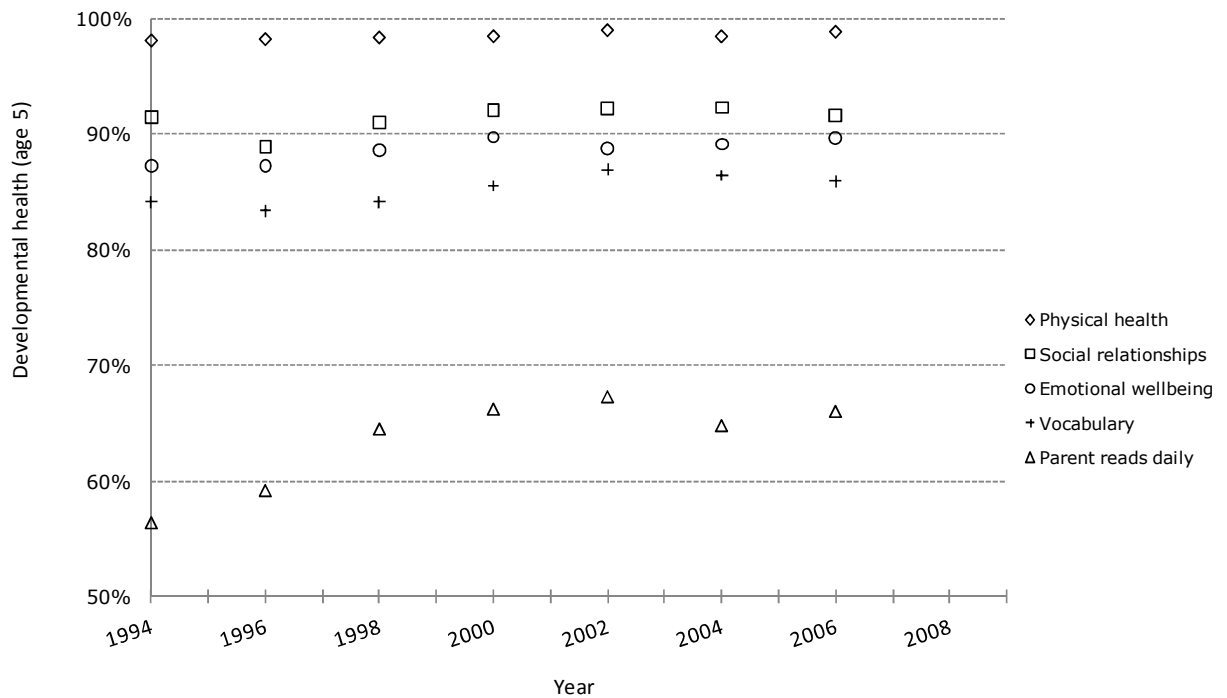
The series represents the average of the percentage rates of children doing well on the five domains of developmental health included in this indicator (physical health; social relationships; emotional competences; physical health; contextual factor (parental reading)). The data are from kindergarten teacher reports on kindergarten-aged children (age 5) in their classrooms.



Source: National Longitudinal Study of Children and Youth (Statistics Canada).

Figure 2b: Transition to school: Developmental health in kindergarten.

The data series reflects the percentage rates of children doing well on the five domains of developmental health chosen for this headline indicator (cognitive skills/vocabulary; social relationships; emotional wellbeing; physical health; contextual factor (parental reading)). The data are from kindergarten teacher reports on kindergarten-aged children (age 5) in their classrooms.



Source: National Longitudinal Study of Children and Youth (Statistics Canada).

3. Student-educator ratio

- Student-educator ratio in public school

Measures and data sources

- Centre for Education, Statistics Canada
 - www.statcan.ca

Comments

This headliner represents the student-educator ratio in public schools, and may be considered a proxy for class size.

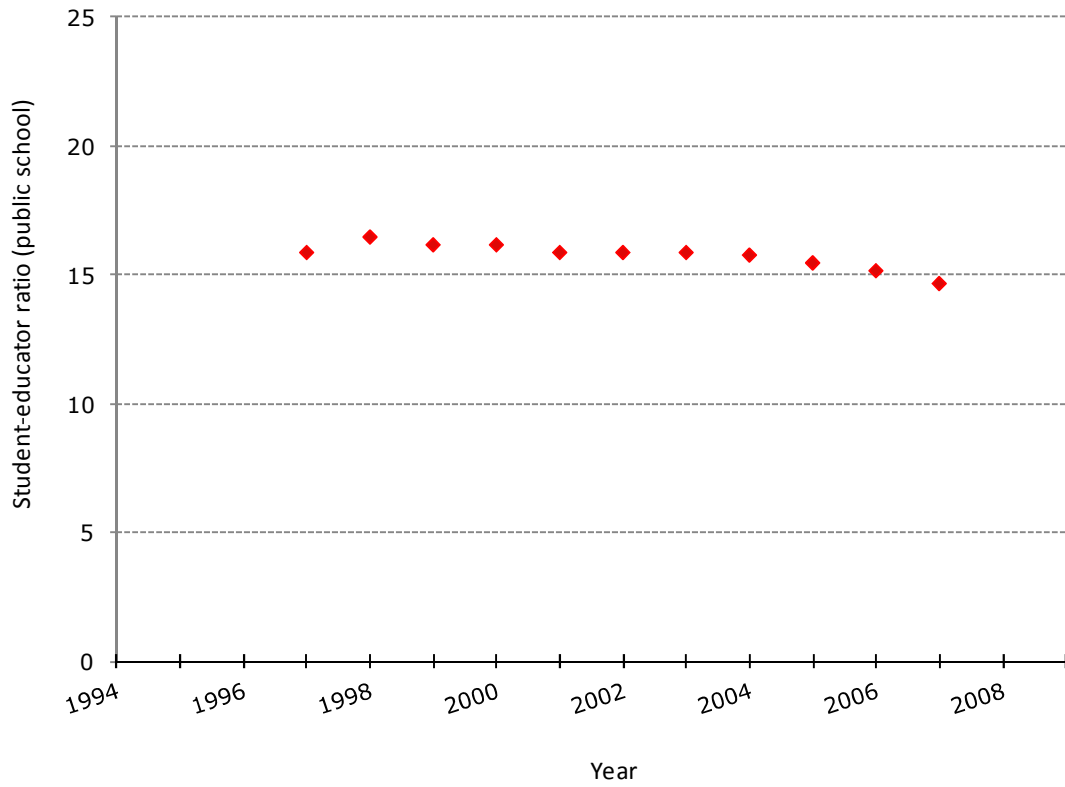
The student-educator ratio may be viewed as a proxy of the time an educator has, on average, to give her or his support and attention to individual students in a class. Over time, significant increases or decreases in class size—in a scenario in which other variables, such as teacher qualifications, support, and staff student ratios remain

relatively constant—would thus be indicative of how much of the resources in the educational system are dedicated to the factor that is most closely related to the amount of time of student-educator/teacher interaction.

Figure 3a shows the average student-educator ratio for the public K-12 school system in Canada. In this ratio, the category *educators* does not solely include teachers, but also administrators and pedagogical support staff. As can be seen, over the past 15 years, the student-educator ratio has, on average, slightly improved. (See Appendix 3 to obtain actual ratios.) This average trend is not, however, representative of individual provinces' trends, a selection of which is shown in Figure 3b. For example, the student-educator ratio has steadily improved in Ontario (from 15.8 to 14.5), Quebec, and the Yukon from 1997 to 2007. In BC, on the other hand, the student-educator ratio has strongly fluctuated and not improved at all (16.9 in 1997 and 16.6 in 2007). In addition, BC has already had one of the poorest student-educator ratios in the country. As a result, the gap between BC and other provinces has widened over the past 15 years (Canada's average improved from 15.9 to 14.7, while BC's poor ratio remained unchanged, so that the gap increased from a 1-point difference to a 2-point difference). Given that the education system is regulated by provincial ministries, these provincial differences in trends and absolute numbers with respect to student-educator ratios thus reflect provincial differences in political and social priorities and policies and/or provincial differences in demographic changes and developments. It will be of interest to see whether the provincial differences in student-educator ratios are parallel to other indicators pertaining to children's wellbeing. (Child poverty rates in BC are, for example, also the highest in the country.)

Figure 3a: Student-educator ratio

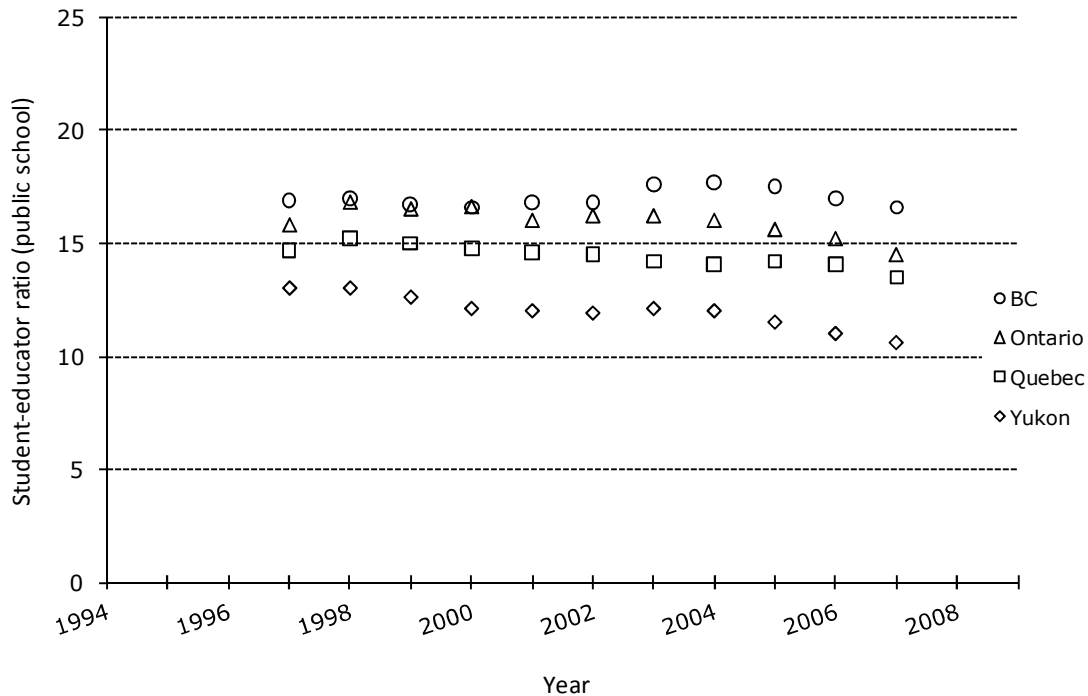
The graph shows the Canadian average of the student-educator (including teachers, school administrators, and pedagogical supports) ratio in the public school system.



Source: Centre for Education (Statistics Canada)

Figure 3b: Student-educator ratio

The graph shows the average student-educator (including teachers, school administrators, and pedagogical supports) ratios in the public school system for a selected number of Canadian provinces.



Source: Centre for Education (Statistics Canada)

4. Social and emotional competences in middle childhood

- Composite headliner of five domains that reflect social and emotional competences of children in middle childhood (age 12-13): empathy; prosocial behavior; friends/social relationships; bullying; self-concept
- The individual indicators are presented to provide detailed background information to facilitate the interpretation of the composite headliner

Measures and data sources

- National Longitudinal Study of Children and Youth (NLSCY), Cycle 2 – Cycle 7 (Statistics Canada)

- www.statcan.ca

Comments

The National Longitudinal Study of Children and Youth (NLSCY; Statistics Canada) contains a number of items on which children aged 12-13 report on their social and emotional competences (e.g., items on social relationships, bullying experiences in

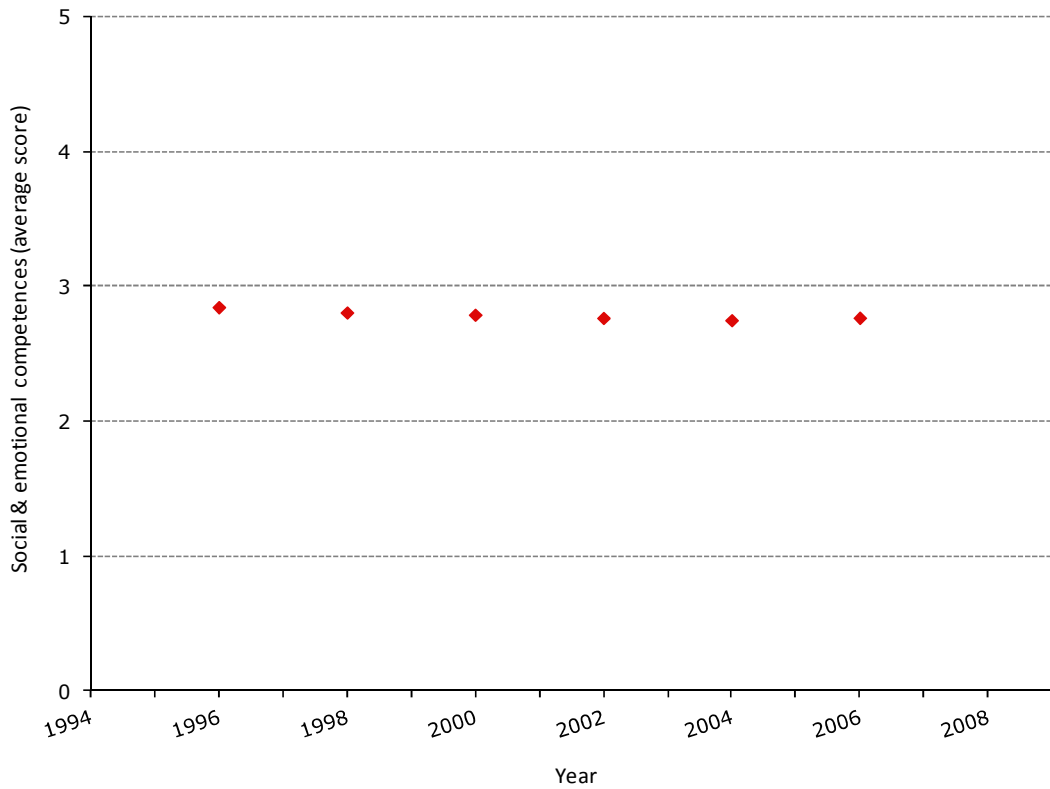
school). According to the expert consultations, this domain is one of the most important domains within education (next to basic educational knowledge and skills).

Figure 4a shows the average score of five domain scores representing social and emotional competences during the end of middle childhood (age 12-13): Self-concept (self-esteem); Peer belonging; Friendship intimacy; Bullying (victimization); and Empathy. (See Appendix 3 to obtain actual average scores.) The individual competence domains are shown in Figure 4b. It should be noted that bullying (victimization), which is the only negative construct in this list, is reverse coded—that is, lower bullying (victimization) scores indicate that *more* bullying (victimization) is reported by the children. In other words, higher scores represent more desirable outcomes, for all five domains.

As can be seen in Figure 4a, the overall trend over the 10 years from 1996 to 2006 has been slightly downward. The trend is not reflected equally in the five individual domains. Figure 4b shows that self-concept and peer belonging have been reported at a steadily high level. Bullying (victimization), friendship intimacy, and empathy, on the other hand, have declined over time, according to children’s self-report. This raises critical questions from social, educational, and developmental perspectives. In an increasingly globalizing, diverse Canadian society, fostering inter-personal competences is critical for building trust and social capital across different groups within our society. If the trend that is shown by the BLSCY data for children in middle childhood reflects a general societal trend, it will be important to understand and address the underlying processes and causes.

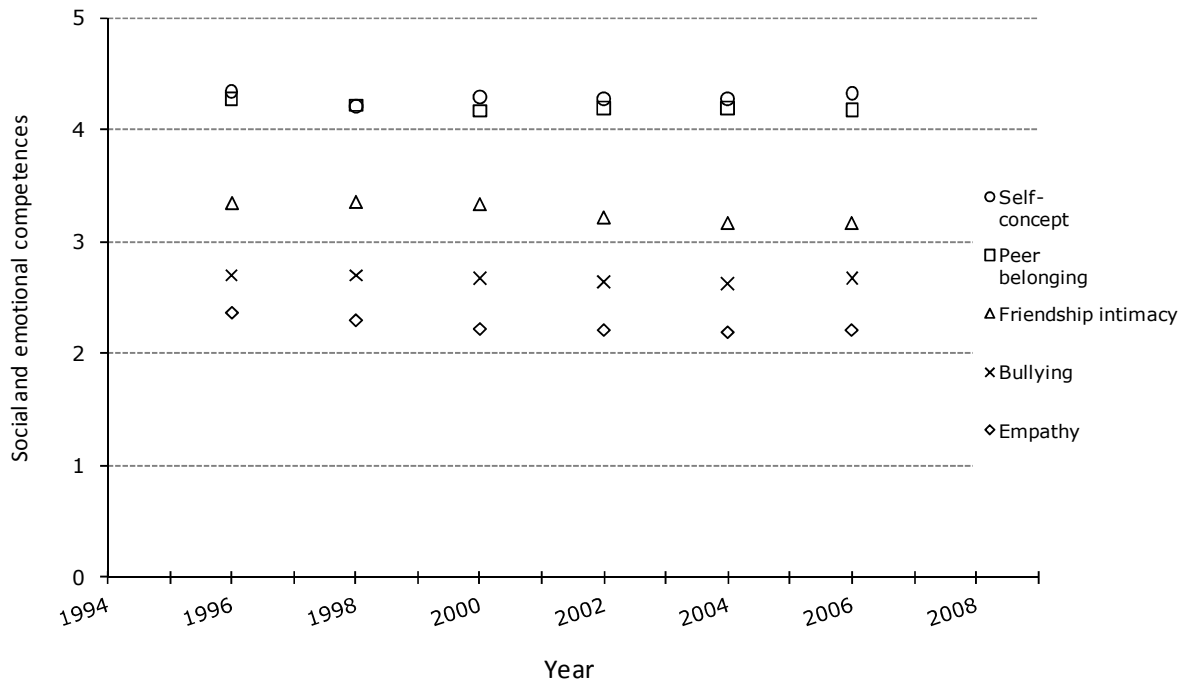
Currently, the Human Early Learning Partnership at the University of British Columbia, in partnership with the Vancouver School Board and United Way of the Lower Mainland is implementing the Middle-Years Development Instrument (MDI), a self-report on which children in middle childhood report on similar constructs as the ones covered by the NLSCY. The goal of the MDI project is to implement the MDI at a provincial level. Accordingly, the NLSCY data used for this indicator of the CIW’s Education domain may, in the future, be complemented by MDI data, in order to allow for more fine-grained analyses at a smaller local level.

Figure 4a: Social and emotional competences in middle childhood (age 12-13). The graph shows the average score of five domains pertaining to social and emotional competences on the NLSCY (self-concept; peer belonging; friendship intimacy; bullying; empathy). The domain scores are derived from self-report surveys conducted with 12 to 13 year-old children.



Source: National Longitudinal Study of Children and Youth (Statistics Canada).

Figure 4b: Social and emotional competences in middle childhood (age 12-13). The graph shows representative Pan-Canadian scores for five domains pertaining to social and emotional competences on the NLSCY (self-concept; peer belonging; friendship intimacy; bullying; empathy). The domain scores are derived from self-report surveys conducted with 12 to 13 year-old children.



Source: National Longitudinal Study of Children and Youth (Statistics Canada).

5. Basic educational knowledge and skills

- Numeracy/mathematics skills (for 13-14 year olds)
- Science skills (for 13-14 year olds)
- Literacy/reading skills (for 15 year olds)

Measures and data sources

- Trends in International Mathematics and Science Study (TIMSS; National Center for Education Statistics, US Department of Education): numeracy/math skills and science skills
 - <http://nces.ed.gov/timss/>
- Programme for International Student Assessment (PISA; Organisation for Economic Co-operation and Development (OECD): literacy/reading skills
 - www.pisa.gc.ca/

Comments

The data from the Trends in International Mathematics and Science Study (TIMSS) are based on a US education government initiative. As the name indicates, TIMSS has obtained data on mathematics and science achievement, for Grade 4 (age 9-10) and Grade 8 (age 13-14) students. Data have been collected since 1995, in a four-year cycle.

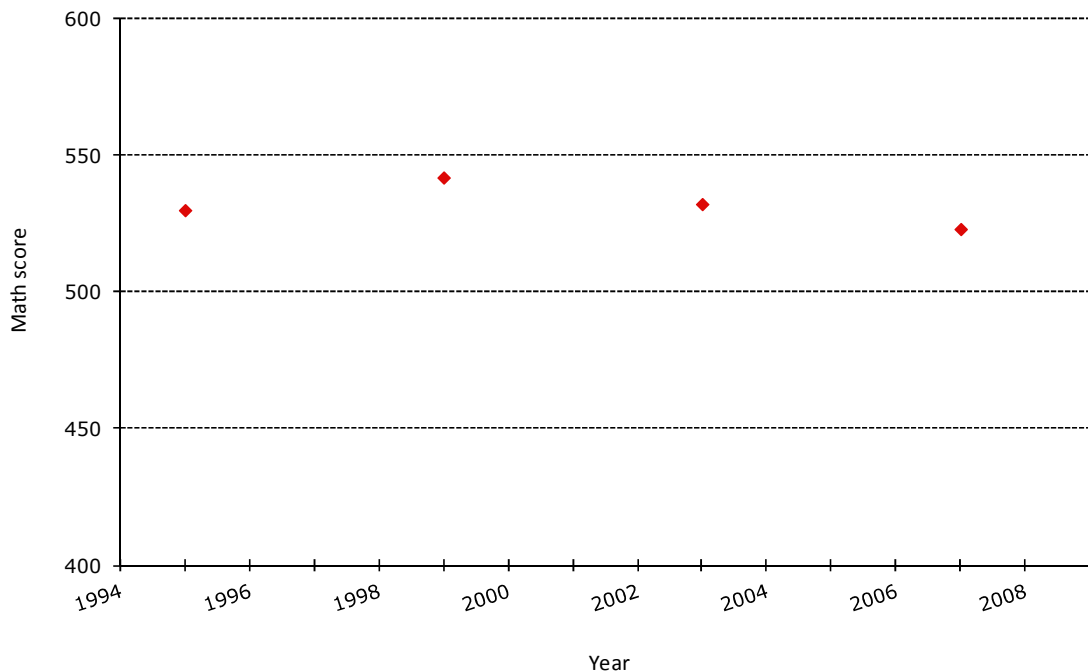
Data from the Programme for International Student Assessment (PISA) by the Organisation for Economic Co-operation and Development (OECD) have been collected for a large number of countries since 2000, in order to allow for international comparisons of basic educational knowledge and skills in Grade 9, at the age of 15 years (www.pisa.gc.ca/). Three areas of educational knowledge and skills have been assessed via the PISA: Literacy, numeracy, and problem-solving skills. (For Canada, however, only literacy/reading skills were assessed for the PISA administrations in 2000, 2003, 2006, and 2009 (forthcoming)). Given the widespread use in research and in the policy realm, the inclusion of the PISA data promises the benefits of having numerous research projects (including cross-national comparisons) associated with it, and of increasing the international visibility of the CIW. In addition, the most comprehensive index on education in Canada to date, the Composite Learning Index (CLI) of the Canadian Council of Learning (CCL) includes the PISA data in their index. This will provide for the opportunity to easily relate the CIW data to the CLI data.

The benefit of including two international data sources—TIMSS and PISA—for this headliner is an increase of reliability, as it allows one to compare trends across two different measures of similar constructs.

Figures 5a to 5c present data from TIMSS and PISA. The graphs show the average scores of participating students in Canada, across the educational domains that were assessed (math, science skills, reading). In both TIMSS and PISA, scores are routinely standardized, so that, for each cohort, the international mean score is 500, and the standard deviation is 50. Therefore, changes in scores from one cohort to the next cannot be interpreted in an absolute manner, but need to be interpreted in relation to the other participating countries. That is, Canada has consistently obtained higher average scores than the international average—however; the scores do not allow one to say whether the 2000 cohort has had better or worse math, science, or reading skills than the 2003 or 2006 cohorts. It has been argued that the fact that PISA and TIMSS data are standardized by cohort makes it impossible to use the data to track progress over time within a given country. Given that the CIW aims to identify trends over time in Canada, this argument would thus advise against using PISA or TIMSS data in the CIW. We agree that it would be even more informative, if PISA and TIMSS data were equitable to a certain baseline in order to track absolute changes over time. At the same time, it may be argued that the inclusion of a relative measure cannot only be meaningful, but is, in fact, critical for a national index. First of all, international comparisons at a given point in time can—as long as one is being mindful of the limitations of international comparisons of education systems via standardized tests—provide a unique platform for discussion and for promoting public awareness. In

addition, in an increasingly globalized world, certain 'basic' academic skills are widely and often similarly valued in societies around the globe. In this regard, cross-nationally comparable indicators of educational outcomes are of interest insofar as policy makers and educators get a sense of where our children stand in comparison to other country members of the international community. As long as the participating countries in the TIMSS and/or PISA studies remain representative of the wider international community, and as long as the standardized tests assess skills that are valued in our society, a relative score on these indicators is interpretable. (See Appendix 3 to obtain actual scores.)

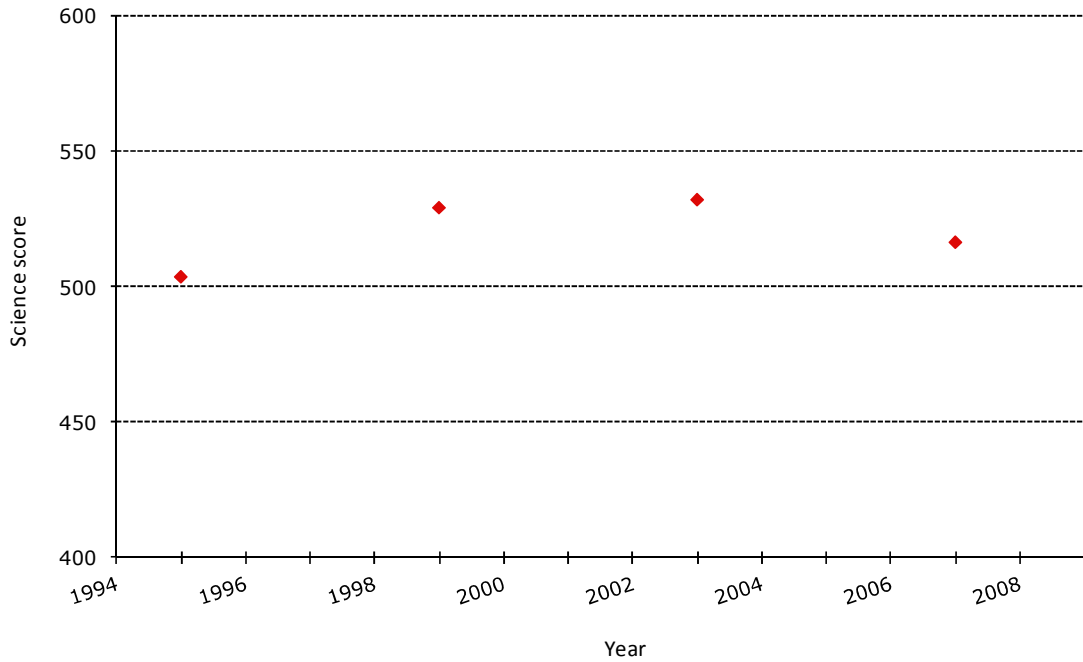
Figure 5a: Basic educational knowledge and skills indicator (math-TIMSS). The graph shows the average score of children who participated in an international assessment of math skills in Grade 8 (TIMSS) for Canada. Scores are standardized for every cohort, so that the international average is 500 and the standard deviation is 50.



Source: Trends in International Mathematics and Science Study (TIMSS), National Center for Education Statistics, US Department of Education

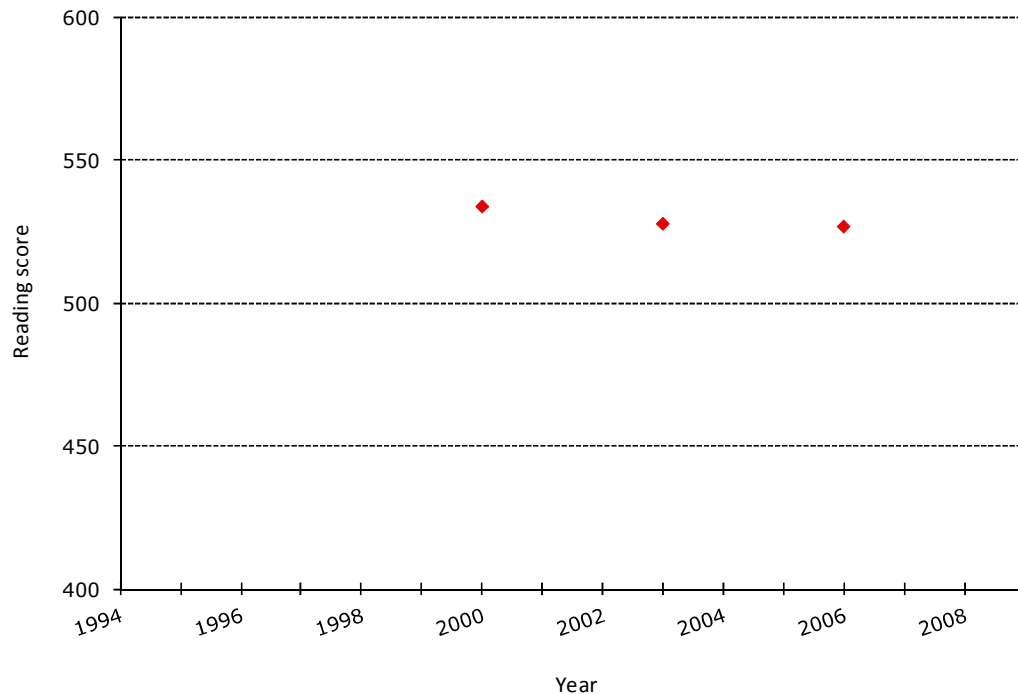
Figure 5b: Basic educational knowledge and skills indicator (science-TIMSS).

The graph shows the average score of children who participated in an international assessment of science skills in Grade 8 (TIMSS) for Canada. Scores are standardized for every cohort, so that the international average is 500 and the standard deviation is 50.



Source: Trends in International Mathematics and Science Study (TIMSS), National Center for Education Statistics, US Department of Education

Figure 5c: Basic educational knowledge and skills indicator (literacy/reading-PISA). The graph shows the average score of children who participated in an international assessment of reading in Grade 9 (PISA) for Canada. Scores are standardized for every cohort, so that the international average is 500 and the standard deviation is 50.



Source: Programme for International Student Assessment (PISA), Organisation for Economic Co-operation and Development

Please note that the choice of combining TIMSS and PISA data requires that the separate indicators need to be merged into one overall headline indicator. We recommend following the CIW standard routine of setting every individual indicator to 100 at 1994, calculate its proportional change over time, and then construe an average. Given that TIMSS data were collected in 1995, 1999, 2003, and 2006, and PISA in 2000, 2006, and 2009, we recommend treating the years 1999 and 2000 as one time point.

6. Equality in education: The socioeconomic gradient

- The variation (as percentage) of PISA literacy scores that is associated with the socio-economic status of the parents of PISA-participating students
- The odds ratio of post-secondary participation rates by parental education: the percentage of students participating in post-secondary education and whose

parents have a high school degree or less, divided by the percentage of students participating in post-secondary education with parents that completed university

Measures and data sources

- Programme for International Student Assessment (PISA; Organisation for Economic Co-operation and Development)
 - www.pisa.gc.ca/
- Survey of Labour Income Dynamics (SLID; Statistics Canada)

Comments

The PISA data include an indicator of socioeconomic status at the individual student level, the so-called indicator of economic, social, and cultural status. This allows one to estimate a socioeconomic gradient for the educational knowledge and skills data. To our knowledge, the PISA data are the only data that allow one to do so for school-aged children, at the individual level, taking into account the parents' socioeconomic status (OECD, 2006).

Data from the Labour Force Survey (Statistics Canada) allow one to construct a socioeconomic gradient that reflects the relationship between participation in post-secondary education (i.e., university, college, trade school, apprenticeship training) of 18-24 year olds and the education level of their parents.

In Figures 6a and 6b, two indicators of (in)equality are presented. In Figure 6a, the relationship between students' socioeconomic background and academic achievement scores from PISA is shown. The numbers indicate how much of the variation (in percent) of the students' PISA scores can be statistically related to differences in socioeconomic background (OECD, 2006). As can be seen, the variation in PISA scores that is related to the socioeconomic status of students' parents is about 10%, and this amount has slightly decreased over the last two PISA cycles. In an international comparison, the relationship between parents' socioeconomic status and children educational achievement in Canada falls into the average range. In Germany, for example, the variation in PISA scores related to parents' socioeconomic status is about 25%, one of the highest relationships among OECD countries. In some other countries (e.g., Finland, Korea), however, the association is much less significant than in Canada, namely around 3 to 5%.

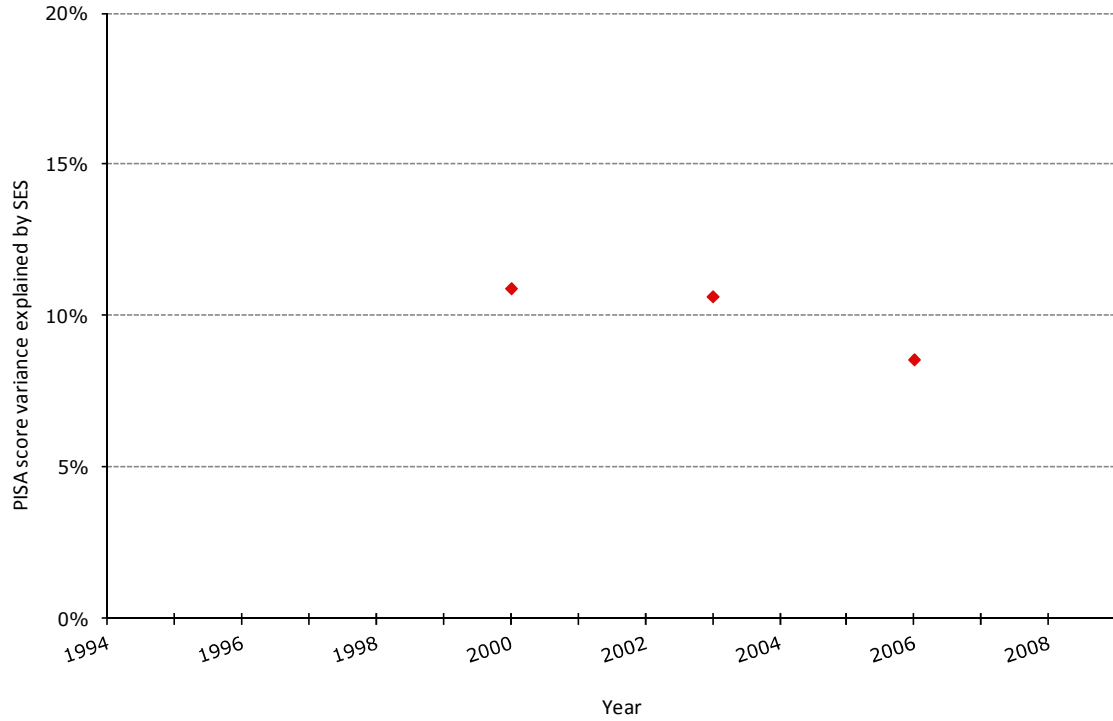
In Figure 6b, the difference between participation rates in post-secondary education for students whose parents have different levels of education is shown as a ratio. The ratio is calculated by dividing the postsecondary education participation rate for students whose parents have completed high school or less, by the postsecondary education participation rate for students for whom at least one parent has obtained a university degree. A ratio of 1 would mean that the postsecondary education participation rate for children whose parents have high school education or less is the same as for children whose parent(s) has/have a university degree. A ratio of .5 would mean that children whose parents have high school education or less are only half as likely to participate in

the postsecondary education process as children whose parent(s) has/have completed university. As can be seen, for Canada, the ratio between the two participation rates has relatively steadily wavered around .7. (See Appendix 3 to obtain actual numbers.)

The relationship between parents' socio-economic status and their children's education attainment falls into the middle range when considered from an international perspective. It must be emphasized, however, that the overall relationship for Canada as a whole may disguise large variation across different groups within Canada. Also, it must be noted that some Aboriginal children attend schools that fall under the jurisdiction of the provincial ministries of Education, and that others attend schools that fall under the jurisdiction of the First Nations. As mentioned above, First Nation schools have been systematically underfunded by the Canadian government (Office of the Parliamentary Budget Officer, 2009) and Aboriginal children have historically been segregated, disadvantaged, and disempowered by the Canadian (education) system.

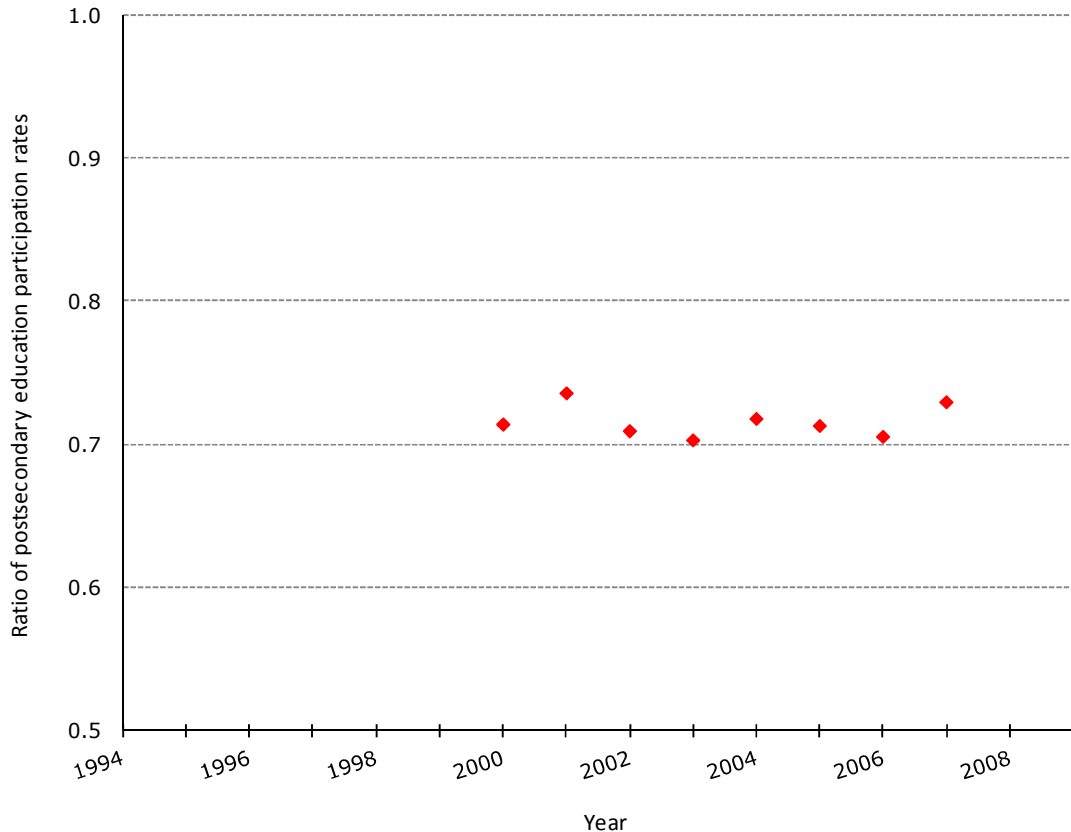
For these reasons, the results presented in this indicator cannot be generalized across all groups of children. Specifically, (in)equality questions with regard to Aboriginal children raise critical questions, and they need to be approached under the leaderships by and/or in close consultation with First Nation community members and by consideration of comprehensive historical, contextual information.

Figure 6a: Socioeconomic gradient indicator. This figure shows how much variation (in percent) of the students' PISA achievement scores can be statistically related to differences in their socioeconomic background.



Source: Programme for International Student Assessment (PISA), Organisation for Economic Co-operation and Development (OECD).

Figure 6b: Socioeconomic gradient indicator. This figure shows an odds ratio. The odds ratio is obtained by dividing (a) the percentage of the 18 to 24 year old population participating in postsecondary education (university; college; professional training; etc.) with parents who obtained a high school diploma or less, by (b) the percentage of the 18 to 24 year old population participating in postsecondary education (university; college; professional training; etc.) with parents who obtained a university degree.



Source: Survey of Labour and Income Dynamics (SLID; Statistics Canada)

7. High school completion

- High school completion (for 20-24 year olds)
 - Percentage rate of high school completion of the population age 20-24

Measures and data sources

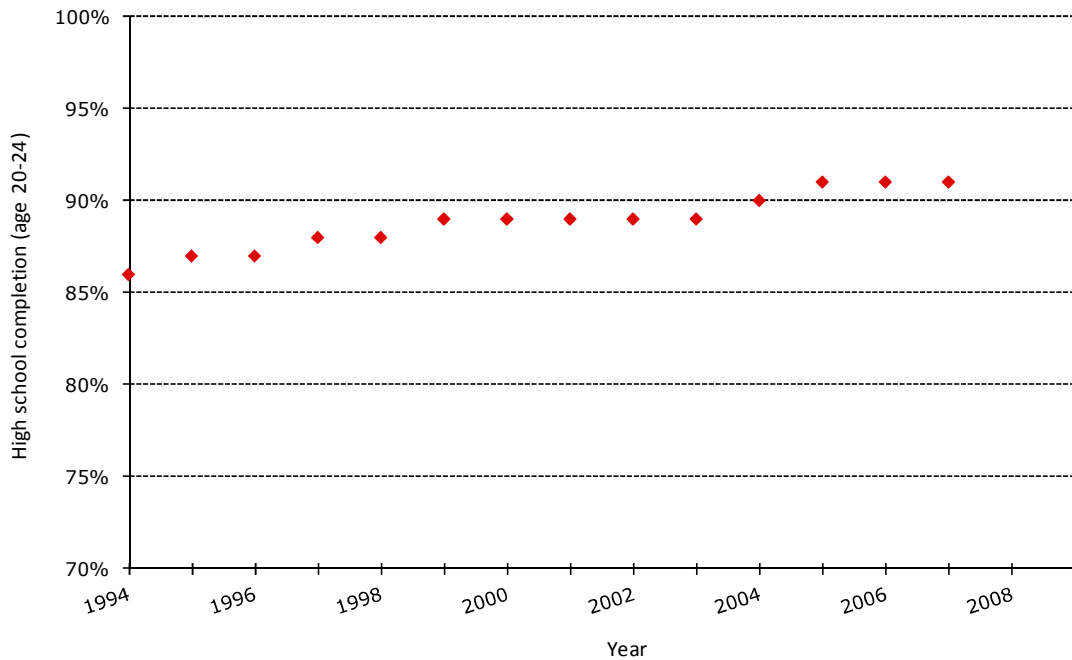
- Labour Force Survey (Statistics Canada)
 - www.statcan.ca

Comments

High school completion is a standard indicator of educational attainment. For the CIW, we follow the practice of the CCL, which, for its Composite Learning Index, uses this indicator, with respect to people aged 20-24. It must be noted that the CCL uses dropout rates, rather than completion rates. Of course, completion and dropout are inversely related; and we use the completion rate statistics solely for the fact that this will allow one to focus on the positive side of the story.

Figure 7 shows the percentage of the Canadian population between 20 and 24 years old that report having completed high school. As can be seen, the trend has gone up slowly but steadily over the past two decades. In the long run, it will be of interest to not only follow the overall trend, but to also track the trends for a number of different sub-populations and groups (e.g., by gender; immigration status; Aboriginal status). (See Appendix 3 to obtain actual percentages.) However, this recommendation does not imply that these subpopulations are homogeneous with regard to their educational trajectories; rather, it will be important to pay attention to variations within subpopulations. For example, in large, ethnically diverse urban contexts, it may be feasible to differentiate between different ESL groups, according to the students' ethno-cultural background (i.e., first language/country of origin).

Figure 7: High school completion. The graph shows the percentage of 20-24 year old Canadians that report having completed high school.



Source: Labour Force Survey (Statistics Canada)

Note: Statistics Canada has started to collect data on children's English-as-a-Second-Language status and on children's Aboriginal status in 2008. Accordingly, comparisons of high school completion rates for ESL and non-ESL students as well as between Aboriginal and non-Aboriginal students can be compared in the near future, and can be integrated into this headliner.

8. Participation and attainment in post-secondary education

- Participation in postsecondary education (age 20-24; overall and by gender)
- University attainment rate (age 25-64; overall and by gender)

Measures and data sources

- Labour Force Survey (Statistics Canada)
 - www.statcan.ca

Comments

Like the high school completion headline indicator, participation and attainment in post-secondary education are standard indicators of education, commonly used in international comparisons (Organisation for Economic Co-operation and Development, 2007), and also included in the Composite Learning Index of the CCL. For the CIW, we chose to include the university attendance rate for the 20-24 year-old population (prevalence) and the university completion rate for the population aged 25-64 (lifetime prevalence).

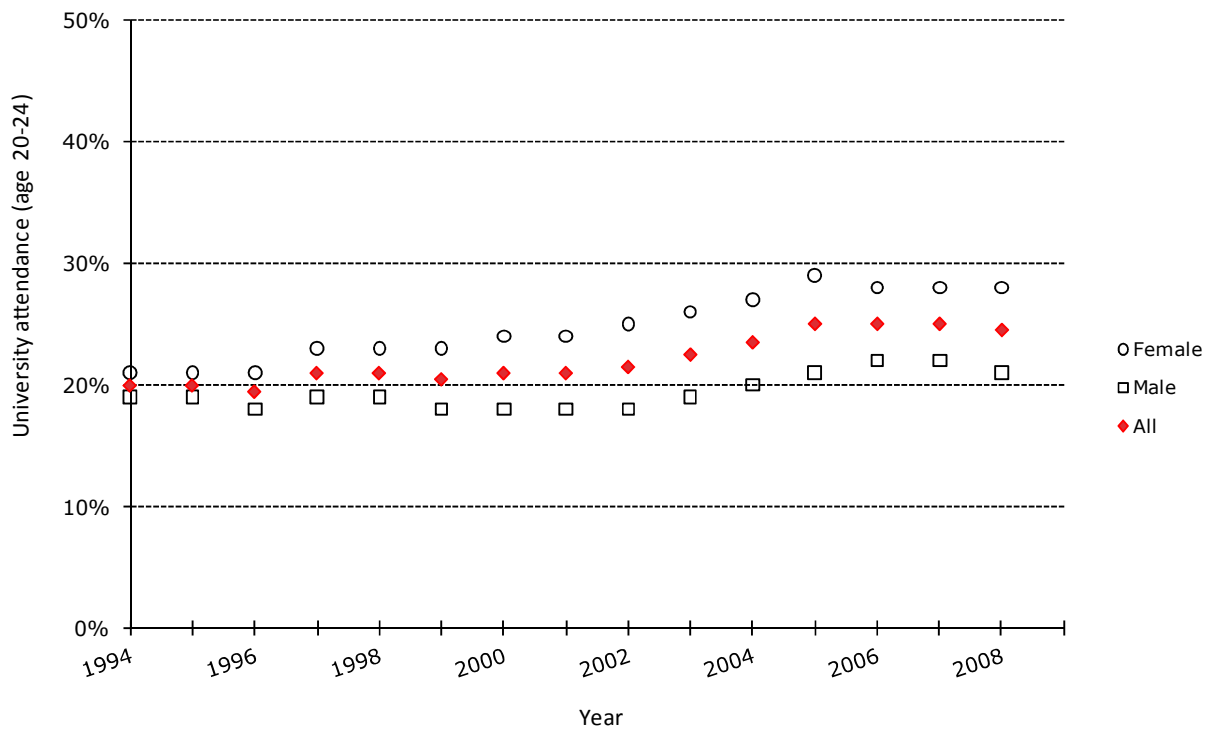
Figure 8a shows the trend line for university attendance of the 20-24 year old population. As can be seen, the trend has slowly, but consistently gone up over the past two decades. (See Appendix 3 to obtain actual percentages.) Of note is the fact that the increase is primarily driven by increased participation rates of women. As described for the high school completion rates (see above), it will, in the long run, be of interest to not only follow the trends of the overall population and the gender groups, but to also differentiate between subpopulations that may be of relevance for particular policy or research questions, practical concerns, and changing societal circumstances.

Figure 8b shows the university attainment rate for the overall population aged 25-64 (diamonds), as well as the respective rates for women (circles) and men (squares). The fact that we have chosen to include the university attainment rate is not to be understood as a value statement regarding the primary importance of university education, as opposed to other types of (formal) education. Rather, the trends for participation and attainment in other forms of post-secondary education (e.g., apprenticeships) have been found to be highly correlated with trends in university participation and attainment. In addition, university attainment is, nationally and internationally more narrowly defined than other types of postsecondary education (e.g., apprenticeships), so that comparisons across jurisdictions are more easily done with university participation and attainment rates than with other indicators of

postsecondary education. Finally, this indicator includes a wide range (25-64), so that there is no specific indicator for smaller age groups within this range (for example, 45-64). Given the current trend that employment in knowledge-based sectors increasingly requires (re)education and (re)training for people who are already in the work force, it will be of interest to see whether this trend is associated with specific increases in postsecondary training in specific age groups.

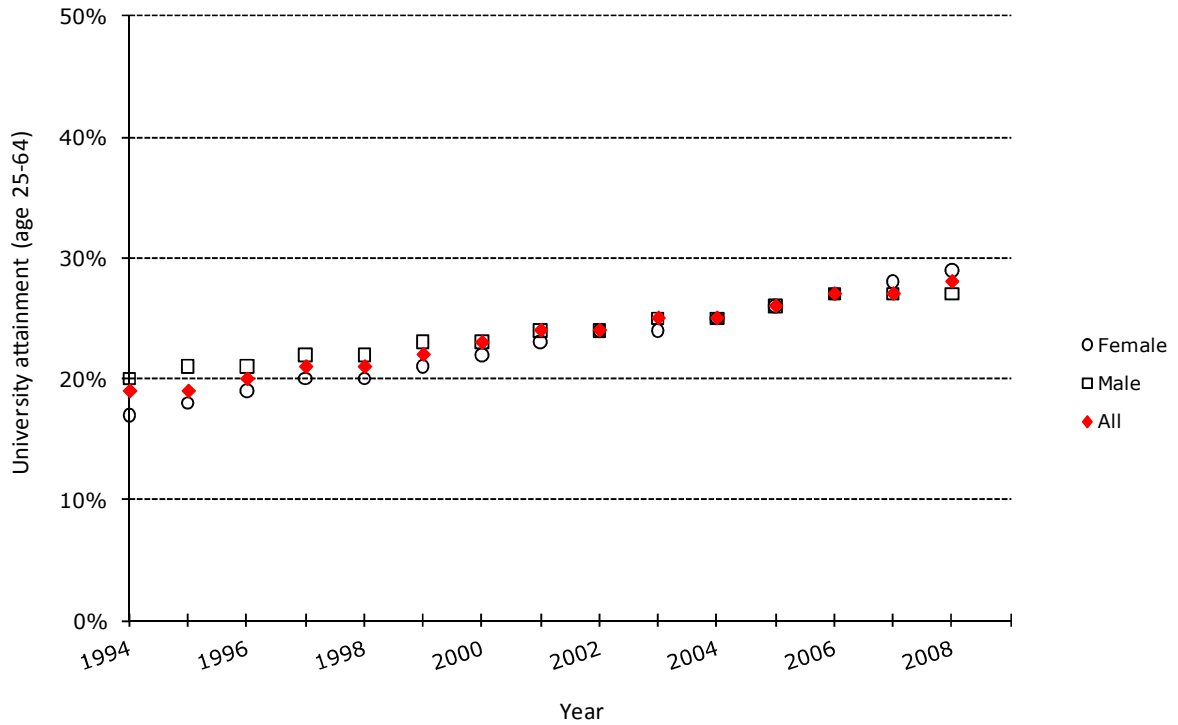
Figure 8a: Participation in postsecondary education (university attendance).

This graph illustrates the proportion of the population between 20 and 24 years old that is attending university during a given year (prevalence). The three series, respectively, represent the overall attendance rate (diamonds), and the rates for women (circles) and men (squares).



Source: Labour Force Survey (Statistics Canada)

Figure 8b: University attainment. This graph illustrates the proportion of the population between 25 and 64 years old that has obtained a university degree or certificate at any point in their life (lifetime prevalence). The three series, respectively, represent the overall attainment rate (diamonds), and the rates for women (circles) and men (squares).



Source: Labour Force Survey (Statistics Canada)

5. Validity and Validation Issues

In this section, we delineate a number of issues pertaining to measurement, validity, and validation. The section is divided into six sub-sections. First, we distinguish between composite and effect indicators in order to clarify some measurement assumptions. Second, we discuss the relevance of conducting an expert consultation with regard to the content validity of a composite index. Third, we address the role of theory (and theory building) with regard to validity. Fourth, we address issues pertaining to the purpose of a measure as well as the social consequences that may arise from decisions made based on measurement data. Fifth, we provide a number of recommendations for ongoing validation research for the Education domain of the CIW, including steps aimed at minimizing or ruling out common validity threats. We conclude with a discussion of how social justice and equity arguments may inform and enhance future validation processes related to the Education domain of the CIW. (Additional information on validity and validation issues concerning the composite CIW may be found in Michalos et al., 2010).

5.1 Composite indicators and effect indicators

The Education domain of the CIW is comprised of 8 headline indicators, which jointly determine a numerical domain score, according to an algorithm delineated by Michalos et al. (2010, p. 19). This domain score will represent 'Education', according to the framework we provided in this report. At this point, however, it is important to note that the measurement literature distinguishes between two general types of indicators with regard to (latent) variables: (i) Formative (or composite) indicators and (ii) effect indicators (see Bollen & Lennox, 1991). A classic example of a latent variable measured via formative indicators is 'socioeconomic status'; here, the construct socioeconomic status is, conceptually and numerically, formed by, or composed of, a number of indicators (typically some measures of education, income, and professional status). An example for a construct that is reflected in effect indicators is 'intelligence'. In this case, it is assumed that the respective scores of the effect indicators are, apart from some measurement error, determined by the construct, that is, by the person's intelligence.

Clearly, the Education domain of the CIW falls into the same category as socioeconomic status, and not intelligence, and may thus be called a latent variable composed of a number of formative (or composite) headline indicators. The distinction between these two types of indicators for latent variables is not only of conceptual relevance, but has important measurement implications. Of particular relevance for this context is the notion that formative indicators—in contrast to effect indicators—do not need to be (highly) correlated. Whereas high inter-item correlations of effect indicators are desirable, because they would be an indication of measurement reliability (as reflected, for example, in a classic internal consistency measure, Cronbach's coefficient alpha), this is not the case for formative indicators. In fact, it has been argued that a high correlation among formative indicators implies redundancy, and can cause multi-collinearity

problems. Also, if two very highly correlated indicators are integrated into one construct, one might argue that these indicators are giving the pertaining sub-construct or some sub-domain double its weight within the overall construct.

The implications of these assertions are fairly straightforward with regard to the Education Populace domain of the CIW, in that the eight headline indicators are not expected to be very highly correlated, but rather capture the entire breadth of the construct, representing each important aspect of it (cf. Bollen & Lennox, 1991).

5.2 Establishing content validity via subject matter expert consultations

For a composite index, it is crucial to validate whether the selection of formative indicators fully capture the construct they are intended to represent. A classic approach toward this issue is to consult subject matter experts (see, for example, Sireci, 1998). In our approach, we conducted a two-part expert consultation process in order to validate our theoretical framework and choice of indicators. Of course, the process is prone to common research validity threats, such as selection bias. For example, choosing solely experts with a similar, narrow notion of what constitutes 'education' might lead to a definition of the construct under question that is not representative. Accordingly, we cast a wide net during our expert consultation process to involve a great variety of education experts, from applied and theoretical fields, and from among practitioners and researchers. Apart from the selection of experts, a definition of a construct is also, to a certain degree, dependent on the social, cultural, and historical context within which it is measured. Therefore, it needs to be emphasized that expert and construct validity are judgments that ought to be revisited over the course of a measure's (or index's) use. This point is revisited in the section on validation research, as expert consultations are considered one essential component of an ongoing validation process (see below).

5.3 The role of theory for validity

Subject matter experts may be, in their opinions regarding a construct, influenced by a number of interdependent considerations, shaped by their experiences, knowledge of empirical findings, disciplinary perspectives, and, implicitly or explicitly, certain heuristics and theories. The notion of integrating empirical findings and theoretical considerations has prominently featured in writings on construct validity since the 1950s (Cronbach & Meehl, 1955) until today (Kane, 2001; 2002). In fact, the process of construct validation has been, in those writings, likened to theory testing and/or theory building.

Accordingly, a measure of a construct is considered to be valid when it relates to other constructs and measurements in theoretically predictable ways. As mentioned in the first section of this report, a theory that links wellbeing to the Education domain or to the eight domains of the CIW in a theoretically predictable manner is not yet established. This being said, it must be noted that efforts along these lines are underway

(Michalos et al., 2010), and that these emerging theories can build on a growing body of theoretical and empirical research that links education to wellbeing (Michalos, 2008).

This scenario is aptly described by what Bronfenbrenner has referred to as *science in the discovery mode* (Bronfenbrenner & Morris, 2006), for which a number of propositions are suggested. According to these propositions, validation research for the CIW in general, and for the Education domain in particular may especially benefit from an approach that is rigorously conducted with the goal of testing and refining emerging theory-based hypotheses.

5.4 The role of purpose, inferences, and social consequences for validity

Lewin coined the phrase that “nothing is so practical as a good theory” (cited in Bronfenbrenner & Morris, 2006). In line with this statement, the role of theory for validity is closely related to the role of a measure’s (practical) purpose and (potential) practical, social consequences for validity. In the validity literature, this notion has been discussed at least since the 1950s (Cureton, 1950; 1951), and has more recently been advocated and elaborated most prominently by Messick (1989; 1994; 1995). In their approach to validity, a measure is valid, in essence, if it accomplishes the purpose it is designed to do. This includes the notion that any inferences based on the scores of a measure, as well as the decisions and social consequences arising from the measurement process are in line with the purpose of the measure. For a process that seeks to establish the validity of a measure, this implies that this aspect of validity needs to be examined deliberately.

Given that the CIW’s purposes are, among others, to serve as a useful policy tool, to create awareness and foster discussion regarding wellbeing, and to maintain and enhance the collective wellbeing of Canadian society, a comprehensive approach to validation thus involves a direct examination of whether these purposes are promoted and accomplished. Strictly speaking, it is not necessary for a measure to be construct-valid in order to be test-valid; after all, a measure might contribute to its purpose with or without a valid theory behind it. At the same time, as mentioned above, “nothing is as practical as a good theory”, and having a valid theoretical framework can be an extremely useful and effective resource for accomplishing the (practical) purposes of a measure. Current thinkers on validity theory (Kane, 2001; Zumbo, 2007, 2009) therefore tend to present the issues of theory testing, theory building, practical purpose, and social consequences of a measure as complementary, mutually informative components of a comprehensive view of validity.

In short, the most important technical characteristics of any measurement or indicator system are those that address aspects of validity. The standards of measurement, as reflected in the scholarly literature, clearly suggest the primacy of validity and call for greater attention to continued efforts of validation for all intended interpretations and uses of the data and results arising from measurements. It is the interpretation or use of

measurement results that are supported (validated), not the measurement or indicators themselves, thus making validation an ongoing process (Kane, 2001; Messick, 1995; Zumbo, 2007, 2009).

5.5 Validation process

In the following, we provide a number of recommendations for ongoing validation research for the Education domain of the CIW, including steps aimed at minimizing or ruling out common validity threats. These recommendations are intended to serve as a framework that can be used to continuously guide and design an (ongoing) validation process accompanying the CIW throughout its use. This framework is primarily informed by Cronbach's and Kane's notion of constructing a validity argument according to a 'chain of inferences' (Cronbach & Meehl, 1955; Cronbach, 1988; 1989; Kane, 2001).

In the past 25 years, particularly in the work of Kane (2001, 2006), argument-based approaches to validation have emerged from the conceptual foundations of validity that provide a framework for gathering and organizing evidence to support intended uses of measurement data. It is pointed out in this approach that individual studies in a validity argument may focus on content analyses, statistical analyses, or relationships to predicted scores (i.e., criteria), but the validity argument, as a whole, requires the integration of different kinds of evidence from different sources. An advantage of articulating an argument for validity is that it provides guidance in allocating research resources and efforts and forces one to focus on the kinds of validity evidence that are more relevant – those that support the main inferences and assumptions and particularly those that are most problematic.

In essence, the metaphorical use of the term 'chain' of inferences reflects the view that any validity argument is only as strong as the weakest link within it. This view denotes that for a validity argument to hold, all the necessary assumptions underlying the inferences one makes based on a measure's scores need to be true. Stated differently, threats to any aspect of the validity argument need to be, as much as possible, ruled out or minimized.

In the following, we sketch out a blueprint of what such a validation framework might look like for the Education domain of the CIW. This blueprint is not intended to be comprehensive; rather, it is intended to highlight a number of validation process aspects that are of particular relevance, and to provide a starting point for continuous elaboration and refinement towards a comprehensive validation process framework. In order to communicate our ideas as clearly as possible, we will use one specific example to consecutively illustrate each of a number of research steps that are part of the proposed validation process.

5.5.1 Validating the consequences of the CIW

One of the key validity issues according to our definition of validity will be to explore whether consequences related to decisions informed by the CIW are in line with the CIW's purposes. The following example will be used to illustrate one way of doing so: It is one of the CIW's essential purposes to maintain and enhance the collective wellbeing of Canadian society. The choice of the headliner 'Basic educational knowledge and skills' in the Education domain implies that an increase of the indicator(s) of basic educational knowledge and skills is, according to the CIW's conceptualization, indicative of or related to an increase of wellbeing. If, for example, policies informed by the CIW are aimed at improving basic educational knowledge and skills, and if these policies are successful, it would obviously be of interest to track whether a systematic increase over time goes hand in hand with positive changes in other areas or not.

Of course, such connections are typically not directly observable. Instead, they are characterized by a high degree of complexity. Also, simply tracking CIW data will not suffice to establish theoretically predictable (causal) relationships, for example, between policy actions and their effect on certain domain scores. Rather, empirical information provided by the CIW and other data sources will have to be supplemented by additional research, and much of the research involves checking whether a number of necessary assumptions hold. Staying with the example, a few steps of this process are outlined.

5.5.2 The measure's sensitivity to change

A basic measurement assumption, which is crucial for the validity of interpreting changes in domain scores over time, is whether a measure is sensitive to change and whether a change in indicator scores accurately corresponds to actual changes in the measured construct(s). Obviously, this is a fundamental reliability issue of concern to any type of measurement. For an index like the CIW, there are, however, a couple of issues that are especially tricky due to the nature of large-scale, longitudinal data collection. First of all, some indicators or measures may be inherently relative, rather than absolute. For example, general educational knowledge and skills, as measured by achievement tests, are relative to the standards of the test. So, unless the standards of the test remain the same, achievement scores of consecutive cohorts might be hard or impossible to compare. It is not uncommon to find sudden jumps or drops between cohorts in, for example, academic achievement tests scores that can be simply explained by a change in test format (e.g., new response format, different questions, different administration conditions).

A second and closely related issue is that of sampling. Differences in sampling (e.g., of respondents to tests or participants of surveys) might lead to changes in scores. Again, the problem is obvious, but may be hard to deal with in practice. For example, it has happened in different contexts that the assessment of academic achievement tests has been intentionally manipulated by the selective exclusion of (groups of) students (e.g.,

low performing students). As obvious as these threats are to validity, they may be difficult to detect, and impossible to prevent, in practice. It is therefore all the more important to deliberately examine them within a comprehensive validation process.

In addition to each individual indicator's reliability, validity, and sensitivity to change, it is also important to look at the entire domain's sensitivity to change. In particular, one needs to be cognizant of the possibility that change in the domain is (justifiably or not) driven by one or few of the eight indicators. This might distort the interpretability of a change in the domain score. For example, let us assume that one of the indicators shows a significant increase, during a time in which all other indicators decrease. Overall, the domain score might still go up, if the change in the one indicator outweighs the decreases in all others. The question then becomes whether the large increase in one domain, in combination with small decreases in all others, can conceptually justify the increase at the domain level. In other words, this issue deals with the compensatory nature of the indicators in relation to each other. During the selection of indicators, this issue can be taken into account by choosing indicators that can be expected to be roughly equivalent in their sensitivity to change and in their importance for the domain. In addition, it needs to be carefully monitored whether changes in the domain score correspond to changes in the construct as witnessed by other sources of evidence.

5.5.3 Changes of the construct and the underlying values

As mentioned before, the Education domain is intended to reflect current (expert) notions of what Education is, as well as values that are widely endorsed by Canadian society at this point in time. Naturally, both might change over time. For example, whereas academic achievement or high school completion rates have been indicators of education widely used for decades, social and emotional competences have only much more recently been measured at a representative level. Similarly, early childhood education has been, in the past, and still is today, not necessarily seen as a mainstream component of 'education'. The inclusion of social and emotional competences as well as early childhood education in the CIW thus presents an elaboration of previously dominant approaches. It thus stands to reason that the construct of education will continuously evolve in our society, and the CIW might actively contribute to this process, and might also have to routinely respond to it. This might be accomplished by repeatedly conducting subject matter expert consultations of the same nature as done for this report (cf. Sireci, 1998).

5.5.4 Interpretations of the Education domain

The creation of research evidence and its subsequent translation into practice or policy actions is a topic that currently attracts much (research) attention, especially in the area of education and health. For example, the government might fund research to establish the evidence for an educational program's effectiveness, and subsequently, schools might

be encouraged, or even required, to implement the identified effective, ‘evidence-based’ programs. As logical as this procedure appears in theory, it has proven not to be as straightforward in practice. One of the major challenges has to do with the adequacy of interpreting research evidence (e.g., correctly identifying causal processes that underlie patterns of empirical relationships). A second major challenge is the difficulty of transferring processes, which have been found effective in one context, to a different context in a (culturally or socially) appropriate way, so that the effects can be replicated (Elias, Zins, Graczyk, & Weissberg, 2003).

In our view, a comprehensive approach to validation thus involves a strategy that addresses this issue of interpretation and implementation. With respect to our recommendations along these lines, we borrow from a framework by Shonkoff (2000). In this framework, Shonkoff describes research, policy and practice as three cultures that share a common mission with regard to education (or social services in general)—but that have distinctly different codes of conduct, needs, language use, time pressures, and practical constraints. For example, researchers feel comfortable with temporary ambiguity and uncertainty, as it is, in fact, the justification for future work. Practitioners, on the other hand, cannot wait for additional research, if they are faced with the urgency to act now. Finally, policy makers may not be primarily concerned about the accuracy and availability of (research) knowledge, but rather about integrating knowledge from a variety of sources into their budgetary, ideological, and/or electoral needs and pressures.

In light of this situation, Shonkoff suggests as a first step that researchers, policy makers, and practitioners commit to a process of “trans-cultural” translation of knowledge, which requires the different groups to closely communicate and collaborate, and make an attempt to understand their respective ‘cultures’. As a second step, Shonkoff recommends that this process be deliberately used to enhance the creation of knowledge that the respective groups can then apply to their settings. Similarly, our recommendation for a comprehensive validation process for the Education domain, and the CIW in general, is to involve researchers, policy makers, and practitioners in a collaborative process aimed at the interpretation of CIW data, and the implementation of decisions that might be based on it.

5.5.5 Social justice and equity

Finally, one aspect of validity and corresponding validation research that deserves special mention, as highlighted by validity theorists such as Messick (1989), is that of social justice and equity—an aspect that is directly related to the interpretation and implementation of research knowledge, as well as to the recurrent validation of values, the construct of education, and the examination of social consequences arising from the CIW. As mentioned before, social justice and equity are values commonly endorsed in Canadian society, particularly with regard to access and opportunity in education. In line with the arguments presented in the section on sensitivity to change, the score of the

Education domain—or any other domain of the CIW—needs to be sensitive to the issue of social justice and equity. In other words, this issue should not be obliterated by the selection of indicators, or their respective sensitivities to change. Choosing ‘Social justice and equity’ in education—measured by the socioeconomic gradient in basic educational knowledge and skills as well as the number of adults with high school completion or less in retraining—as one of the indicators is a step in that direction. It is clear, though, that a number of further social justice and equity issues are not captured by the Education domain score. For example, the participation of certain groups that have systematically been disadvantaged in the past could, hypothetically, decrease, while the participation of the overall population increases—so that an increase in inequity would coincide with an ‘improvement’ of the domain score.

Of particular interest in this regard are social justice and equity with respect to First Nations and Indigenous peoples, as well as people from immigrant backgrounds, as these groups have been, and still are, relatively often disconnected from the educational mainstream process (e.g., their respective high school completion rates are lower than they are for non-Aboriginal and non-immigrant children; Tait, 1999). At the same time, we hesitate to recommend an indicator that inherently comes with the danger of ‘labeling’ disadvantaged groups—especially without having been able to conduct a proper consultation with the groups that will be affected the most by such an approach. If anything, tracking of sub-groups, at this point in time, should probably remain at the sub-domain level, and be reserved for research purposes of the CIW. In the long term, there could, ideally, be an indicator that captures educational success stories of children from Aboriginal backgrounds and immigrant backgrounds in a way that is culturally appropriate. Recently, due to the First Nations Education Act in BC (BC Ministry of Education, 2007), there are an increasing number of schools and programs that fall under the jurisdiction and government of First Nations in BC. It is still too early to take an educated guess on what the exact implications will be of the new legislation; but in the future, it might possibly be adequate to construct, for example, an indicator for high school completion among students attending the schools under First Nations jurisdiction.

The take away message from this last part of our chapter on measurement and validity is that the motifs underlying a social justice and equity approach might be considered a framework of ideals that are explicitly reflected in the process of validation, and can be used as guiding principles. In other words, in light of the complexity of developing and managing the CIW over time, the validation process for the Education domain should, regardless of the technical subtleties involved in the details of the process, always return to the question of whether its development and usage are in line with principles of social justice and equity.

6. Conclusions and Future Recommendations

This report, in essence, presents (i) an introduction that recapitulates the purpose of the CIW, (ii) an attempt to provide a widely accepted definition of ‘education’ and a corresponding theoretical framework, (iii) a description of the method we used to validate our framework and to inform the selection of indicators (i.e., via a subject matter expert consultation), (iv) descriptions of eight headline indicators, and corresponding measures and data sources, that represent the construct of ‘education’, and (v) a discussion of measurement and validity issues of particular relevance to the CIW’s Education domain, which concludes with recommendations for an ongoing validation (research) process.

In this section on conclusions and recommendations, we focus on two themes. The first theme addresses data challenges for some of the non-traditional headline indicators we have chosen (i.e., early childhood education, social and emotional competences in middle childhood, equity in education, and adult education and lifelong learning). The second theme directs attention to a caveat that is inherent to work with indices intended for policy use and practical purposes.

6.1 Non-traditional headline indicators

A number of indicators that are, according to our theoretical framework and the validating information from our subject matter expert consultation, crucial components of the education construct, have been—despite their importance—non-traditional in the world of education indicators. These indicators are the following: (i) Early childhood education, (ii) Student-educator ratio, (iii) Social and emotional competences in middle childhood, and (iv) Equity in education: The socioeconomic gradient. Several reasons for why these indicators have not (yet) been traditional, mainstream indicators of education have been discussed throughout the report. The fact that such indicators are now available is highly significant. It indicates that there has been a critical mass of interest, resources, and organizational momentum in the national and international education community to make such indicators a reality. The decision to feature these newly available indicators in the CIW, and embedding them in a strongly developmental and holistic educational framework has been made with the deliberate intent to further promote that critical mass of interest, to contribute to needed resources and information, and to elevate the momentum dedicated to promote children’s educational trajectories and their wellbeing in a holistic, developmentally appropriate way. After all, the decision of what gets measured is itself a value statement’ (Rogers, 1995), and, typically, ‘what gets assessed, gets addressed’. Accordingly, the indicators of the Education domain were chosen to particularly stimulate discussion with regard to the early years, equity, and equality, as they are all considered broad, fundamental prerequisites for children’s development and wellbeing, and thus for the future wellbeing of our society.

6.2 Measuring proxies versus processes

We would like conclude with one issue that is of particular general conceptual-methodological import for the validity of the Education domain of the CIW, and, in fact, for educational and developmental indicators in general. All of the indicators selected for the Education domain are either context characteristics (e.g., student-educator ratio) or outcome measures (e.g., basic educational skills). Context variables or outcome measures, in and of themselves, do not, however, provide any information about the actual processes that are leading to those outcomes (Bronfenbrenner & Morris, 2006). At the same time, context or outcome indicators are often understood as proxies of such processes. For example, a high rate of high school completion is often understood as a proxy for the quality of the educational processes that, in sum, have led to the situation that a given percentage of students are meeting graduating criteria. The rationale for this is quite clear: Higher quality of educational processes leads to, all other things being equal, higher completion rates (Hanushek & Rivkin, 2004; Hopkins & Stern, 1996). This being said, it needs to be realized that the quality of the educational process is not the only factor that affects completion rates. For example, completion rates could also improve due to lowered standards, or a number of other processes. In non-experimental research, all relevant processes cannot, typically, be taken into account. As a result, research findings can only assume, but hardly prove, that the processes that were actually examined are causally related to the outcomes measured. After all, a number of unexamined processes—sometimes called ‘hidden processes’ (see Datnow, Lasky, Stringfield, & Teddlie, 2005)—could have led to the outcomes. Even if measures and/or outcomes are, in one context, validly reflecting certain processes, it may still be possible that the same measures/outcomes do not correspond to the same processes in the same way in another context. Despite this realization, research findings, including their conclusions, from one context are sometimes uncritically transferred to other contexts.

The following example illustrates this point. If, for example, high completion rates have been associated with a number of specific educational practices in one context, a high completion rate in another context does not necessarily mean that the same educational practices are present there, too. The reverse is also true: If certain educational processes in one context are associated with completion rates, it does not allow one to infer that the implementation of those very processes in another context will result in the same relationships with completion rates. That is, outcome measures used as indicators for, in this case, education, can only be proxies for specific educational processes. Conceptually, it might be useful to think of the measures as proxies for broad constellations of processes, the nature of which is dependent on the characteristics of the context. In our opinion, it is important to be clearly aware of this inherent limitation of the nature of indicators, because taking this point rigorously into consideration during the use and refinement over time will substantially increase the potency of the Education domain specifically, and, assumably, the CIW in general.

7. References

- Arthur, J., & Davison, J. (2000). Social literacy and citizenship education in the school curriculum. *Curriculum Journal*, 11, 9-23.
- Aspin, D. N., & Chapman, J. D. (2000). Lifelong learning: Concepts and conceptions. *International Journal of Lifelong Education*, 19, 2-19.
- Audas, R., & Willms, J. D. (2001). *Engagement and dropping out of school: A life-course perspective*. Hull, QB: Human Resources Development Canada.
- Baltes, P. B., Lindenberger, U., & Staudinger, U. M. (2006). Life span theory in developmental psychology. In R. M. Lerner & W. Damon (Eds.), *Handbook of child psychology (6th ed.): Vol 1, theoretical models of human development* (pp. 569-664). Hoboken, NJ: John Wiley & Sons Inc.
- Baltes, P. B., & Smith, J. (2004). Lifespan psychology: From developmental contextualism to developmental bio-cultural co-constructivism. *Research in Human Development*, 1, 123-144.
- Barber, M. & Mourshed, M. (2007). *How the world's best-performing school systems come out on top*. Retrieved August 1, 2008, from http://www.mckinsey.com/clientservice/socialsector/resources/pdf/Worlds_School_Systems_Final.pdf
- BC Ministry of Education (2007). First Nations Education Act. Retrieved Oct 12, 2008, from http://www.leg.bc.ca/38th3rd/1st_read/gov46-1.htm
- Bear, G. G., Manning, M. A., & Izard, C. E. (2003). Responsible behavior: The importance of social cognition and emotion. *School Psychology Quarterly*, 18, 140-157.
- Belsky, J. (1988). The "effects" of infant day care reconsidered. *Early Childhood Research Quarterly*, 3, 235-272.
- Belsky, J. (1988). The "effects" of infant day care reconsidered. *Early Childhood Research Quarterly*, 3, 235-272.
- Bollen, K., & Lennox, R. (1991). Conventional wisdom on measurement: A structural equation perspective. *Psychological Bulletin*, 110, 305-314.
- Bredenkamp, S., & Copple, C. (Eds.) (1997). *Developmentally appropriate practice in early childhood programs* (2nd ed.). Washington, DC: National Association for the Education of Young Children.
- Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In R. M. Lerner & W. Damon (Eds.), *Handbook of child psychology (6th ed.): Vol 1, theoretical models of human development* (pp. 793-828). Hoboken, NJ: John Wiley & Sons Inc.
- Caprara, G. V., Barbaranelli, C., Pastorelli, C., Bandura, A., & Zimbardo, P. G. (2000). Prosocial foundations of children's academic achievement. *Psychological Science*, 11, 302-306.
- Collins, W. A. (Ed.) (1984). *Development during middle childhood: The years from six to twelve*. Washington, DC: National Academy Press.
- Corak, M., Lipps, G., & Zhao, J. (2003). Family income and participation in postsecondary education. Ottawa, Ca: Statistics Canada. Retrieved on January 10 from <http://www.statcan.gc.ca/pub/11f0019m/11f0019m2003210-eng.pdf>
- Cronbach, L. J. (1988). Five perspectives on the validity argument. In Wainer & H. I.

- Braun (Eds.), *Test validity* (pp. 3-17). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Cronbach, L. J. (1989). Construct validation after thirty years. In R. L. Linn (Ed.), *Intelligence: Measurement, theory, and public policy: Proceedings of a symposium in honor of Lloyd G. Humphreys* (pp. 147-171). Champaign, IL: University of Illinois Press.
- Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological Bulletin*, *52*, 281-302.
- Cureton, E. E. (1950). Validity, reliability and baloney. *Educational and Psychological Measurement*, *10*, 94-96.
- Cureton, E. E. (1951). Validity. In E. F. Lindquist (Eds.), *Educational measurement* (pp. 621-694). Washington, DC: American Council on Education.
- Darby, J. T., & Catterall, J. S. (1994). The fourth R: The arts and learning. *Teachers College Record*, *96*, 299-328.
- Datnow, A., Lasky, S. G., Stringfield, S. C., & Teddlie, C. (2005). Systemic integration for educational reform in racially and linguistically diverse contexts: A summary of the evidence. *Journal of Education for Students Placed at Risk*, *10*, 445-453.
- Delors, J., Mufti, I., Amagi, I., Carneiro, R., Chung, F., Geremek, B., et al. (1996). *Learning: The treasure within. Report to UNESCO of the International Commission on Education for the 21st century*. Paris, France: UNESCO Publishing.
- Doherty, G. (1997). *Zero to six: The basis for school readiness*. Hull, QB: Human Resources Development Canada.
- Doherty, G., Lero, D. S., Goelman, H., LaGrange, A., & Tougas, J. (2000). *You bet I care! A Canada-wide study on wages, working conditions, and practices in child care centres*. Guelph, ON: Centre for Families, Work and Well-Being, Department of Family Relations and Applied Nutrition, University of Guelph.
- Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., et al. (2007). School readiness and later achievement. *Developmental Psychology*, *43*, 1428-1446.
- Elder, G. H. J., & Shanahan, M. J. (2006). The life course and human development. In R. M. Lerner & W. Damon (Eds.), *Handbook of child psychology (6th ed.): Vol 1, theoretical models of human development* (pp. 665-715). Hoboken, NJ: John Wiley & Sons Inc.
- Elias, M. J., Zins, J. E., Graczyk, P. A., & Weissberg, R. P. (2003). Implementation, sustainability, and scaling up of social-emotional and academic innovations in public schools. *School Psychology Review*, *32*, 303-319.
- Entwisle, D. R., & Alexander, K. L. (1993). Entry into school: The beginning school transition and educational stratification in the United States. *Annual Review of Sociology*, *19*, 401-423.
- Finn, J. D., & Achilles, C. M. (1990). Answers and questions about class size: A statewide experiment. *American Educational Research Journal*, *27*, 557-577.
- Finn, J. D., & Achilles, C. M. (1999). Tennessee's class size study: Findings, implications, misconceptions. *Educational Evaluation and Policy Analysis*, *21*, 97-109.
- Flook, L., Repetti, R. L., & Ullman, J. B. (2005). Classroom social experiences as predictors of academic performance. *Developmental Psychology*, *41*, 319-327.

- Friendly, M., & Beach, J. (2005). *Early childhood education and care in Canada 2004* (6th ed.). Toronto, ON: Childcare Resource and Research Unit, University of Toronto.
- Gardner, H. (2004). *Frames of mind: The theory of multiple intelligences*. New York, NY: Basic Books.
- Goelman, H., Forer, B., Kershaw, P., Doherty, G., Lero, D., & LaGrange, A. (2006). Towards a predictive model of quality in Canadian child care centres. *Early Childhood Research Quarterly, 21*, 280-295.
- Hanushek, E., & Rivkin, S. G. (2004). How to improve the supply of high-quality teachers. In D. Ravitch (Ed.), *Brookings papers on education policy*. Washington, DC: Brookings Institution.
- Hayward, K., Pannozzo, L., Colman, R., & Hayward, V. (2007). *Canadian Index of Wellbeing: Educated Populace indicator report*. Toronto, ON: Atkinson Charitable Foundation.
- Hopkins, D., & Stern, D. (1996). Quality teachers, quality schools: International perspectives and policy implications. *Teaching and Teacher Education, 12*, 501-517.
- Izard, C. E. (2002). Translating emotion theory and research into preventive interventions. *Psychological Bulletin, 128*, 796-824.
- Izard, C. E., Trentacosta, C. J., King, K. A., & Mostow, A. J. (2004). An emotion-based prevention program for head start children. *Early Education and Development, 15*, 407-422.
- Janus, M., & Offord, D. R. (2007). Development and psychometric properties of the early development instrument (EDI): A measure of children's school readiness. *Canadian Journal of Behavioural Science/Revue Canadienne des Sciences du Comportement, 39*, 1-22.
- Jenkins, A., Vignoles, A., Wolf, A., & Galindo-Rueda, F. (2003). The determinants and labour market effects of lifelong learning. *Applied Economics, 35*, 1711-1721.
- Kane, M. T. (2001). Current concerns in validity theory. *Journal of Educational Measurement, 38*, 319-342.
- Kane, M. T. (2006). Validation. In R. Brennan (Ed.), *Educational measurement* (4th ed., pp. 18-64). Westport, CT: Praeger Publishers.
- Kaufman, J. C., & Sternberg, R. J. (Eds.) (2006). *The international handbook of creativity*. New York, NY: Cambridge University Press.
- Keating, D. P., & Hertzman, C. (Eds.) (1999). *Developmental health and the wealth of nations: Social, biological, and educational dynamics*. New York, NY: Guilford Press.
- Kershaw, P., Irwin, L., Trafford, K., & Hertzman, C. (2005). *The British Columbia atlas of child development*. Victoria, BC: Human Early Learning Partnership and Western Geographical Press.
- Kornhaber, M. L., & Gardner, H. (2006). Multiple intelligences: Developments in implementation and theory. In M. A. Constan & R. J. Sternberg (Eds.), *Translating theory and research into educational practice: Developments in content domains, large-scale reform, and intellectual capacity* (pp. 255-276). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- Labonté, R., Muhajarine, N., Winquist, B., & Quail, J. (2009). Healthy Populations. A report of the Canadian Index of Wellbeing. Retrieved on September 2009 from

http://www.ciw.ca/Libraries/Documents/HealthyPopulation_DomainReport.sflb.a.shx

- Mayer, J. D., Roberts, R. D., & Barsade, S. G. (2008). Human abilities: Emotional intelligence. *Annual Review of Psychology*, *59*, 507-536.
- Messick, S. (1989). Validity. In R. L. Linn (Ed.), *Educational measurement (3rd ed.)*, (pp. 13-103). New York, NY: Macmillan Publishing Co, Inc.
- Messick, S. (1994). Foundations of validity: Meaning and consequences in psychological assessment. *European Journal of Psychological Assessment*, *10*, 1-9.
- Messick, S. (1995). Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning. *American Psychologist*, *50*, 741-749.
- Michalos, A. C. (2008). Education, happiness and wellbeing. *Social Indicators Research*, *87*, 347-366.
- Michalos, A. C., Sharpe, A., Arsenault, J., Muhajarine, N., Labonte, R., Scott, K., et al. (2010). *An Approach to the Canadian Index of Wellbeing*. Toronto, ON: Canadian Index of Wellbeing.
- Mosteller, F. (1995). The Tennessee study of class size in the early school grades. *The Future of Children*, *5*, 113-127.
- Mustard, F., & McCain, M. (1999). *The early years report*. Ottawa, ON: Government of Ontario.
- Nahapiet, J. (1998). Social capital, intellectual capital and the organizational advantage. *The Academy of Management Review*, *23*, 242.
- National Education Goals Panel (1994). *The national education goals report: Building a nation of learners, 1994*. Washington, DC: U.S. Government Printing Office.
- Northwest Regional Educational Laboratory (1997). *The fourth R: Responsibility-ensuring educational excellence through equity and effective school practices. An equity handbook for learning communities*. Portland, OR: Center for National Origin, Race and Sex Equity.
- Nye, B., Hedges, L. V., & Konstantopoulos, S. (1999). The long-term effects of small classes: A five-year follow-up of the Tennessee class size experiment. *Educational Evaluation and Policy Analysis*, *2*, 127-142.
- Nye, B., Hedges, L. V., & Konstantopoulos, S. (2000). The effects of small classes on academic achievement: The results of the Tennessee class size experiment. *American Educational Research Journal*, *37*, 123-151.
- Nye, B., Hedges, L. V., & Konstantopoulos, S. (2002). Do low-achieving students benefit more from small classes? Evidence from the Tennessee class size experiment. *Educational Evaluation and Policy Analysis*, *24*, 201-217.
- Office of the Parliamentary Budget Officer (2009). *The funding requirement for First Nations schools in Canada*. Ottawa, Canada. Retrieved on September 30, 2009 from www.parl.gc.ca/pbo-dpb.
- Organisation for Economic Co-operation and Development (OECD) (2007). *Education at a glance 2007. OECD indicators*. Paris, France: Organisation for Economic Co-operation and Development.
- Organisation for Economic Co-operation and Development (OECD) (2007). *PISA 2006. Volume 2: Data/Données*. Paris, France: Organisation for Economic Co-

- operation and Development.
- Rogers, T. B. (1995). Mathematical foundations of testing: The quantitative worldview (Ch. 4, pp. 103-132). *The psychological testing enterprise: An introduction*. Pacific Grove, CA: Brooks/Cole Pub. Co.
- Schliemann, A. D. (2000). Informal learning. In A. E. Kazdin (Ed.), *Encyclopaedia of psychology*, vol. 4. (pp. 288-290). New York, NY: Oxford University Press.
- Schweinhart, L. J., & Weikart, D. P. (1997). The High/Scope preschool curriculum comparison study through age 23. *Early Childhood Research Quarterly*, 12, 117-143.
- Shonkoff, J. P. (2000). Science, policy, and practice: Three cultures in search of a shared mission. *Child Development*, 71, 181-187.
- Shonkoff, J. P., & Phillips, D. A. (Eds.) (2000). *From neurons to neighborhoods: The science of early childhood development*. Washington, DC: National Academy Press.
- Siddiqi, A., Subramanian, S. V., Berkman, L., Hertzman, C., & Kawachi, I. (2007). The welfare state as a context for children's development: A study of the effects of unemployment and unemployment protection on reading literacy scores. *International Journal of Social Welfare*, 16, 314-325.
- Sireci, S. G. (1998). The construct of content validity. In B. D. Zumbo (Ed.), *Validity theory and the methods used in validation: Perspectives from the social and behavioral sciences* (pp. 83-117). Netherlands: Kluwer Academic Press.
- Sternberg, R. J. (1997). Managerial intelligence: Why IQ isn't enough. *Journal of Management*, 23, 475-493.
- Sternberg, R. J. (Ed.) (2004). *International handbook of intelligence*. New York, NY: Cambridge University Press.
- Sternberg, R. J., & Grigorenko, E. L. (2005). Intelligence and culture: How culture shapes what intelligence means, and the implications for a science of well-being. In F. Huppert, B. Keverne, & N. Baylis (Eds.), *The science of well-being* (pp. 361-377). New York, NY: Oxford University Press.
- Tait, H. (1999). *Educational achievement of young aboriginal adults*. Canadian social trends No. 52). Ottawa, ON: Statistics Canada.
- Thiessen, V. (2001). *Policy research issues for Canadian youth: School-work transitions*. Ottawa, ON: Statistics Canada and Human Resources and Social Development.
- Thomas, E. M. (2006). *Readiness to learn at school among five-year-old children in Canada*. (Children and Youth Research Paper Series). Ottawa, ON: Statistics Canada.
- Trentacosta, C. J., & Izard, C. E. (2007). Kindergarten children's emotion competence as a predictor of their academic competence in first grade. *Emotion*, 7, 77-88.
- Wallin, N. L., Merker, B., & Brown, S. (Eds.) (2000). *The origins of music*. Cambridge, MA: The MIT Press.
- Wallis, C., & Steptoe, S. (2006). How to bring our schools out of the 20th century. *Time Magazine*. Retrieved October 1, 2008, from <http://www.time.com/time/magazine/article/0,9171,1568480,00.html>
- Wayne, A. J., & Youngs, P. (2003). Teacher characteristics and student achievement gains: A review. *Review of Educational Research*, 73, 89-122.
- Wentzel, K. R. (1991). Relations between social competence and academic achievement in early adolescence. *Child Development*, 62, 1066-1078.
- Wentzel, K. R., Barry, C. M., & Caldwell, K. A. (2004). Friendships in middle school:

- Influences on motivation and school adjustment. *Journal of Educational Psychology*, 96, 195-203.
- Willms, J. D. (1999). Quality and inequality in children's literacy: The effects of families, schools, and communities. In D. P. Keating, & C. Hertzman (Eds.), *Developmental health and the wealth of nations: Social, biological, and educational dynamics* (pp. 72-93). New York, NY: Guilford Press.
- Willms, J. D. (2006). Variation in socioeconomic gradients among cantons in French- and Italian-speaking Switzerland: Findings from the OECD PISA. *Educational Research and Evaluation*, 12, 129-154.
- Zigler, E. F., & Bishop-Josef, S. J. (2006). The cognitive child versus the whole child: Lessons from 40 years of head start. In D. G. Singer, R. M. Golinkoff & K. Hirsh-Pasek (Eds.), *Play = learning: How play motivates and enhances children's cognitive and social-emotional growth* (pp. 15-35). New York, NY: Oxford University Press.
- Zigler, E., & Styfco, S. J. (2008). America's Head Start program: An effort for social justice. In C. Wainryb, J. G. Smetana & E. Turiel (Eds.), *Social development, social inequalities, and social justice* (pp. 53-80). New York, NY: Taylor & Francis Group/Lawrence Erlbaum Associates.
- Zumbo, B. D. (2007). Validity: Foundational issues and statistical methodology. In C. R. Rao, & S. Sinharay (Eds.), *Handbook of statistics, vol. 26: Psychometrics* (pp. 45-79). The Netherlands: Elsevier Science B.V.
- Zumbo, B. D. (2009). Validity as Contextualized and Pragmatic Explanation, and Its Implications for Validation Practice. In Robert W. Lissitz (Ed.) *The Concept of Validity: Revisions, New Directions and Applications*, (pp. 65-82). IAP - Information Age Publishing, Inc.: Charlotte, NC.

8. Appendices

Appendix I: Expert consultation Phase I

(Verbal) question at professional meeting with education professionals:

Currently, my colleagues and I are involved in a project called 'The Canadian Index of Wellbeing'. The project is a national initiative that will track the wellbeing of Canadians by collecting data in the following eight domains:

1. Environment;
2. Healthy Populations;
3. Education;
4. Time Use;
5. Democratic Engagement;
6. Community Vitality;
7. Leisure and Culture; and
8. Living Standards.

For this project, two colleagues of mine at UBC and I are in the process of preparing a report that will lead to recommendations for which indicators or measures to include in one of the domains, namely, the Education domain. As a first step, we are conducting a subject matter expert consultation, and are therefore asking you to get your advice regarding the following question:

'If you could choose three domains, indicators, or measures to reflect how educated the Canadian people are with respect to maintaining and improving the collective wellbeing of Canadian society, which ones would you pick?'

Please take about 5-10 minutes to list up to three favourite choices on a sheet of paper, which I will collect if you do not mind sharing with us.

Please feel free to include comments or questions on your answer sheet, and please also talk to me in person or via email, if you have any further ideas or suggestions.

Thank you!

Appendix 2: Expert consultation Phase 2

Subject:

Canadian Index of Wellbeing (CIW) – Subject matter expert consultation

Dear [name of subject matter expert],

The Canadian Index of Wellbeing (CIW) is a national initiative that will track the wellbeing of Canadians by collecting data in the following eight domains:

1. Environment;
2. Healthy Populations;
3. Education;
4. Time Use;
5. Democratic Engagement;
6. Community Vitality;
7. Leisure and Culture; and
8. Living Standards.

The CIW's development is guided by a team of national and internationally renowned experts and indicator practitioners and two cross-Canada public consultations. The CIW Project is funded through a Funders' Alliance led by the Atkinson Charitable Foundation.

(For details, please see the attached document, or visit www.ciw.ca.)

For this project, Dr. Bruno Zumbo, Anne Gadermann, and I are in the process of preparing a report that will lead to recommendations for which indicators or measures to include in one of the domains, namely, the Education domain. As a first step, we are conducting a subject matter expert consultation, and are therefore contacting you to get your advice regarding the following question:

'If you could choose three indicators or measures to reflect how educated the Canadian people are with respect to maintaining and improving the collective wellbeing of Canadian society, which ones would you pick?'

Please list up to three favourite choices below.

[Please note: Your indicators ideally are already existent indicators or measures (e.g., routinely collected data from the Ministry of Education or Statistics Canada; please indicate if this is the case). Alternatively, they may be measures you wish could be developed in the future (e.g., a new survey; please feel free to elaborate).]

- 1.
- 2.
- 3.

We are looking forward to your reply and thank you in advance for your time and feedback!

Please contact us with any questions you might have.

Appendix 3: CIW Education domain data matrix

		94	95	96	97	98	99	00	01	02	03	04	05	06	07	08
Headline indicator		Description														
1. Early Childhood Education (ECE)		Number of ECE spaces/ number of children														
2. Transition to school		NLSCY: average percentage of children who are doing well on 5 developmental domains														
3. Equity		Student-educator ratio														
4. Social and emotional competences in middle childhood		NLSCY														
5. Basic educational knowledge and skills		Index*														
		PISA literacy														
		TIMSS math														
		TIMSS science														
6. Equality		PISA-SES														
Postsecondary education (odds ratio)																
7. High school completion (20-24 year olds)																
8. Postsecondary participation and attainment		University attendance (20-24 year olds)														
University attainment (25-64 year olds)																

* The Index values for the 5th headline indicator (Basic educational knowledge and skills) represent the mean of the PISA literacy score and the TIMSS math and science scores for a given year. Please note that the 1995 and 1999 PISA scores do not represent actual PISA data; instead, the PISA score from the year 2000 was inserted, following the procedure for interpolating missing data in CIW indicator series, as suggested by Michalos et al. (2010).

Appendix 4: Data Sources

Early Child Education and Care: Availability of child care spaces (age 5)

http://childcarecanada.org/ECEC2006/tables_long/ECEC06_Table27.pdf

(<http://childcarecanada.org/ECEC2006/index.html>)

Transition to school: Developmental health in kindergarten (age 5)

National Longitudinal Study for Children and Youth (NLSCY), Statistics Canada
Cycles 1-7

Provided by courtesy of Marc Lachance, Canadian Council on Learning

Student-educators ratio

(www.ccl-cca.ca/pdfs/LessonsInLearning/Sep-14-05-Making-sense-of-the-class-size-debate.pdf);

www.statcan.gc.ca/pub/81-595-m/81-595-m2009078-eng.pdf

Social and emotional competences in middle childhood

National Longitudinal Study for Children and Youth (NLSCY), Statistics Canada
Cycles 2-7

Basic educational skills

TIMSS

<http://nces.ed.gov/pubs2001/2001027.pdf>

1995 and 1999 (Canadian averages): <http://nces.ed.gov/pubs2001/2001027.pdf>

1995, 1999, 2003 for QB and ON:

Math: http://timss.bc.edu/PDF/t03_download/T03_M_Chap1.pdf

Science: http://timss.bc.edu/PDF/t03_download/T03_S_Chap1.pdf

(<http://pirls.bc.edu/timss1995i/Database.html>)

(1999: <http://www.cust.educ.ubc.ca/wprojects/TIMSS/TIMSS99.pdf>)

(1999: http://nces.ed.gov/timss/results99_1.asp)

PISA:

PISA 2000: <http://www.pisa.gc.ca/pisa/81-590-xpe.pdf>;

(<http://www.oecd.org/dataoecd/44/53/33691596.pdf>)

PISA 2003: <http://www.pisa.gc.ca/81-590-xie2004001.pdf>

PISA 2006: <http://www.pisa.gc.ca/81-590-E.pdf>;

(<http://www.oecd.org/dataoecd/15/13/39725224.pdf>)

Equality:

Standardized effect of socioeconomic status on achievement from PISA/OECD 2006 data:

<http://www.pisa.oecd.org/dataoecd/30/18/39703566.pdf>; (<http://www.pisa.gc.ca/pisa/81-590-xpe.pdf>)

Odds ratio of percentage of students participating in postsecondary education with parents who completed high school or less, divided by the percentage of students participating in postsecondary education with parents who completed university education:

Survey of Labour and Income Dynamics (SLID), Statistics Canada

Provided by courtesy of Marc Lachance, Canadian Council on Learning

High school completion for 20-24 year olds; Statistics Canada, Labour Force Survey:

<http://www.statcan.ca/english/freepub/81-004-XIE/2005004/drop.htm>

<http://www.statcan.ca/english/freepub/81-004-XIE/2005004/drop.htm#table1>

Post-secondary participation for 20-24 year olds; CCL graph based on Labour Force Survey data, Statistics Canada:

[http://www.ccl-cca.ca/NR/rdonlyres/CAC7D2C5-DA8A-4E4B-B052-](http://www.ccl-cca.ca/NR/rdonlyres/CAC7D2C5-DA8A-4E4B-B052-F06662BD8ED8/0/ParticipationInPostSecondaryEducationEN.pdf)

[F06662BD8ED8/0/ParticipationInPostSecondaryEducationEN.pdf](http://www.ccl-cca.ca/NR/rdonlyres/CAC7D2C5-DA8A-4E4B-B052-F06662BD8ED8/0/ParticipationInPostSecondaryEducationEN.pdf)

University attainment for 25-64 year olds; CCL graph based on Labour Force Survey data, Statistics Canada:

http://www.ccl-cca.ca/pdfs/PSE/2009/PSE2008_English.pdf