PIAAC CYCLE 2 BQ DRAFT CONCEPTUAL FRAMEWORK

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Conceptual Framework for the Background Questionnaire – PIAAC Cycle 2

1. Introduction

This document outlines the conceptual framework of the Background Questionnaire (BQ) for Cycle 2 of PIAAC. We start in Section 2 with a description of the policy context and the broad questions that PIAAC aims to answer. In Section 3 we present the theoretical background for the main concepts covered in the BQ, in the form of an extensive review of the scientific and policy literature. This overview focuses on three main points: the nature and distribution of key skills across countries and social groups; the potential sources of differences between countries and sub-populations in the level of proficiency of key skills; and the ways in which key skills affect economic and non-economic outcomes in today's complex and rapidly changing world. All in all, this section shows how recent research on the distribution, acquisition, use, decline, and outcomes of skills has informed the design of the BQ, and explains how the various topic areas covered in the BQ contribute to addressing the aims of PIAAC. We conclude Section 3 with a discussion of limitations of the BQ. In Section 4, we present the structure of the BQ, with a concise outline of each of the BQ sections. In Appendix 1, we present a more detailed overview of the sections of the BQ, including definitions and rationales for all included concepts. This Appendix starts with a list of criteria for selection for items in the BQ. In Appendix 2, we present the doorstep interview, which is new to PIAAC in Cycle 2. Finally, we conclude this document with Appendix 3 containing a detailed overview of changes that were made in the BQ compared to Cycle 1 of PIAAC, including a description of the rationale for these changes.

2. The policy context of PIAAC

Addressing the main objectives of PIAAC

PIAAC Cycle 2 aims to achieve three broad objectives (OECD 2017). First, it aims to paint a picture of the stock of those information processing, social and emotional, and other transversal skills needed for effective functioning in the labour market and in society in general across a wide range of countries. Secondly, PIAAC Cycle 2 intends to contribute to understanding of how these skills relate to important economic and social outcomes, and to individual, institutional and social factors that can influence the development, maintenance, and loss of such skills over the lifecycle. Finally, PIAAC Cycle 2 provides an important tool for policy makers interested in finding optimal ways to enhance the development, maintenance and productive deployment of these skills.

The BQ has an important role to play in meeting all three of these objectives of PIAAC Cycle 2. When monitoring the stock of skills in a given country, basic descriptive statistics based on the population as a whole, such as the average or median level, or the amount of skill variance or inequality, are on their own of limited use. They are even less useful for cross-country comparisons given that populations demographically differ markedly across countries (e.g. some countries have more migrants or more young people than others). It is therefore preferable

to adjust those descriptive statistics by core demographic variables such as age, gender, or migration background. It is important to have a good picture of where the available skills are concentrated most, and of population subgroups that suffer a higher risk of skill deficiencies, such as the low educated, rural populations, or those with a low socio-economic background. The BQ therefore needs to provide data that allow us to accurately identify such subgroups, as defined, for example, by age, gender, migration background, socioeconomic background, educational attainment, labour force status, occupation, and sector of industry.

Additionally, the BQ builds on these basic demographic and socio-economic background variables, adding further detail that allows a better understanding to emerge of *how* skills are related to economic and social outcomes, as well as to a wider range of experiences that may be related to their acquisition, maintenance and decline. The BQ therefore requires well-validated measures of a broad range of economic outcomes to allow a better understanding of the processes that link skill levels to such things as employment prospects, working hours, earnings, job security, occupational status, and the quality of the match between education and work. The same applies to outcomes in other life domains, such as personal health, political efficacy and social trust. With respect to experiences contributing to skill acquisition, maintenance and decline, i.e. antecedents of skills, formal education is clearly an important focus. In addition to the highest attained level, the specific pathways taken to achieve this level and the particular field of education followed may be related to current skill levels in the population. Participation in training is also often thought to have a strong effect on skills. Other activities undertaken during the course of work and/or everyday life (e.g. collaboration with co-workers) can also have a strong effect on skill development and maintenance. As such, the BQ also needs to capture determinants of skills in various domains.

In sum, although PIAAC is a survey of adult skill levels, the skill measures on their own are of little value in the absence of additional information on the people possessing those skills across the participating countries. In that respect the direct assessment and the BQ together form an integrated whole, and the core rationale for including a BQ in PIAAC is that it can capture such additional information.

The main policy questions

As articulated in its three main objectives, PIAAC Cycle 2 aims to shed light on important questions of how modern societies function, how their institutions and their constituent citizens are able to deal with the rapid and sometimes bewildering changes taking place in the world, and how "at-risk" populations with low literacy levels can be identified. These more general analytical questions are closely linked to policy questions of how to design policies to enhance the effective production, maintenance and deployment of skills in society. More specifically, the following three broad policy questions are central in PIAAC (OECD, 2012):

1. How are skills distributed?
2. Why are skills important?
3. What factors are related to skill acquisition?

Below we describe for each of these broad questions how the BQ can contribute to answering these questions.

How are skills distributed?

It is difficult to overstate the importance that is attached to the distribution of skills in policy discussions and debates in today's world (European Commission 2016; OECD 2017; Martin 2018). One of the major concerns for most countries is that they may be falling behind in the race to provide their populations with the skills that are required to compete and function in the world. Within countries there are concerns that certain subpopulations are heavily affected by low levels of key skills, which severely hampers their ability to take part in the economy, enjoy good health and well-being and to function in broader society. Beyond the resulting individual distress, this places a severe burden on the countries' resources and budgets, and may even foster political instability. At the other end of the spectrum, there are also concerns voiced as to whether there are enough people with high levels of these skills, so that countries can stay close to the cutting edge in terms of new technological and economic developments. In some countries though, it rather seems like there is an oversupply already of high levels of general skills, and shortages rather with respect to medium and high levels of vocational skills.

Therefore, policymakers have an interest in monitoring the stock of human capital in their country and in identifying the different levels among relevant subgroups. The BQ of PIAAC Cycle 2 has a crucial role to play in filling major knowledge gaps as to the distribution of the stock of skills in a country. For example, one purpose of the BQ is to capture specific skills that are not captured by the direct assessment. It enables the assessment of the stock of human capital in a society by providing a descriptive analysis of the distribution of skills proficiencies, as well as skills use, in the adult population. This is crucial for the development of effective policies, as well as for allowing citizens to make informed choices in acquiring skills through education and training (Martin 2018), and it will allow countries to answer questions like:

- How do skill levels compare across demographic subgroups defined by gender and age across countries?
- How do countries compare in terms of socio-economic and migrant inequalities in skills?
- How do skill levels compare across sectors of industry? Are there certain sectors of industry that are characterised by particularly low levels of skills proficiency? How do the skill levels of these sectors compare to those in other countries?

Why are skills important?

There is little interest from a policy point of view for any investment in skills if it has no relation with relevant outcomes. Other services are competing with education and training – the main policy handles for skill production – for a share in budgets, so the case for returns to educational investment needs to be made on a secure and sophisticated evidence base. Moreover, governments and the public make education accountable to show the effects of their efforts. From a policy point of view, the main justification for devoting a large portion of national budgets to investment in education is the assumption that it brings forth skills that contribute directly to relevant outcomes, and this public investment cannot be fully replaced by private investments (OECD 2012). For that reason, one of the key goals of the BQ is to provide indicators that can be used to show if differences in skills matter economically and socially. The most obvious area in which policymakers are interested is how skills levels relate to economic outcomes of individuals. Cognitive skills are considered a key determinant of an individual's productivity, and there is robust evidence linking cognitive skills to both economic

outcomes (e.g., income, social status) and non-economic outcomes such as health, well-being, and political engagement. Adverse outcomes in such areas place large burdens on governments, democracy, businesses, and individuals, including both the direct expenditure of resources (such as government spending on health care) and indirect costs (such as the value of goods and services workers do not produce while ill). Above and beyond cognitive skills, social and emotional skills such as conscientiousness or emotional stability have emerged as important determinants to the same economic and non-economic outcomes. By including a measure of such social and emotional skills, PIAAC Cycle 2 will provide unprecedented opportunities for policy-relevant research into how cognitive and social and emotional skills co-shape life; and how their relative importance varies by the specific outcome under consideration, by sociodemographic subgroup, and/or by country. Additionally, one of the main contributions of PIAAC is in freeing researchers and policy analysts from the need to conduct discussions on the returns to skills through proxies such as education and training. From a policy perspective, this overreliance on educational attainment as a proxy for human capital is unsatisfactory, not only because education is an imperfect measure of skills, but also because of a risk of misattribution when interpreting the labour market returns from investments in education (Martin 2018). The value of a large-scale cross-national database allowing effects of education and skills on outcomes to be estimated simultaneously is difficult to overstate. Therefore, the inclusion of both cognitive and non-cognitive (i.e., social and emotional) skills, economic and non-economic outcomes as well as measures of formal and non-formal education in the BQ is needed to allow countries to address questions such as:

- To what extent do those with higher cognitive skills earn more and enjoy better career development and working conditions than lower skilled individuals, when they hold the same level of qualification? How do social and emotional skills add to these relationships? Do these relationships vary across countries?
- Are there groups with skill proficiency levels that are so low that these form a barrier to participation in the labour force, political participation and social life? Are these groups demographically similar across countries?
- To what extent is the relation between education and training on the one hand and economic outcomes on the other mediated by skills? Can high cognitive skills or specific social and emotional skills compensate for low educational qualifications? Does this differ across countries?
- Is there a general relation between skills and well-being, health or social and political engagement? If so, to what extent is this mediated by economic outcomes? How does this differ between subpopulations and across countries?

What factors are related to skill acquisition and decline?

From a policy perspective, it is important to understand the factors that may be related to skill development, because this helps render policy more effective, as well as allowing a better understanding of why certain subpopulations are exposed to a higher risk of low literacy. It is important to not only understand factors that can be directly influenced by policy, like education and training, but also factors that are incidental to the manner in which people go about their daily lives, like the family setting during childhood, or simply trying out new things at work and in social life and learning through trial and error. Despite a vast amount of research dating back to the middle of the last century, much remains unknown about the exact contribution of education to skill levels relative to other learning processes, and of the mechanisms through which learning is achieved. Finally, we need to be aware that skills can be acquired, but also can be lost. Preventing skill decline is, in times of population ageing, probably just as important

as promoting skill acquisition, but the underlying factors affecting these processes may be quite different (Levels & Van der Velden forthcoming) and it is important to have good insight in both processes. Therefore, the BQ needs to capture a broad range of measures of formal and non-formal education ("training"), as well as other determinants of skills acquisition and decline (e.g. childhood conditions and working conditions). This enables countries to answer questions like:

- How are formal and non-formal education and training related to skill development? Do these relationships vary across countries?
- What differences exist between subpopulations in terms of learning strategies and effects of education and training? Are there indications that current learning institutions are placing certain sub-populations at a disadvantage?
- How do patterns of skill acquisition and skill decline vary between subpopulations? Are the factors that determine skill acquisition the same as those that mitigate skill decline?

3. Theoretical Background

In this section, we describe the main theoretical elements of the conceptual framework and, where relevant, indicate the items that have been included in the BQ to reflect these elements. The purpose of this part is to provide a solid theoretical basis for the policy questions formulated in the previous section, and to serve as a guideline for the selection of relevant concepts and the translation of those concepts into specific indicators (or questions) in the BQ. This framework will also serve as a guideline for the analysis and interpretation of the data, both in the field trial, where it will be used to derive predictions on how particular sets of variables are expected to behave, and in the main survey, where it will be used to derive hypotheses pertaining to the policy questions outlined in the previous section.

The presentation of the theoretical framework will be divided into three parts, roughly corresponding to the three types of policy questions described in Section 2. We start with a brief overview of the literature on the nature and distribution of key skills. Although the direct assessment (DA) as such falls outside the scope of the development of the BQ, the raison d'être of the BQ is to provide the context information needed for analysing and interpreting the results of the DA. As a consequence, it is essential to not only focus on how the BQ enables us to interpret the distribution of key skills, but to also give a brief description of what skills are actually being measured in the DA (and, equally important, of what skills are not being measured). Following this, we summarise the literature pertaining to skills acquisition and decline, and relate this to how we approach the measurement of determinants of skills acquisition and decline in the BQ. The theoretical discussion concludes with a similar review of the literature on economic and non-economic outcomes of skills, again linked to the measurement of these outcomes in the BQ.

The nature and distribution of key skills

As was noted in Section 2, policymakers have a strong interest in knowing how skills are distributed across countries as well as across different subgroups within countries, such as age, gender, migration status, sector of industry, and levels and fields of education. If we want to answer these questions, it is important to first take a step back and reflect on what is being compared. Before discussing the role of the BQ in examining the distribution of skills, we

therefore start with a brief overview of the literature on so-called key skills, of which the skills measured in PIAAC form an important subset.

The quest for key skills

The last few decades have seen an increased awareness of human capital as one of the driving forces of economic development. Policymakers have realised the importance of investing in education and training as a way of improving the existing stock of skills. This has resulted in an accompanying need to monitor and assess the stock of human capital. What soon became clear is that education, as such, is a poor indicator of the stock of human capital. Individuals with the same nominal level and type of education can differ markedly in their command of various skills. Likewise countries that have more or less comparable levels of educational attainment can nevertheless differ substantially in the level of skills that are acquired in education. This has been shown in studies like Adult Literacy and Life Skills Study (ALL).

As the emphasis shifts from educational qualifications towards skill measurement, the question naturally arises as to what skills should be measured. It seems clear that in order to perform even the most basic tasks, many discrete skills are required. Determining which skills should be measured is a complex and difficult task, which is compounded by the fact that people not only make use of generic skills such as the ability to communicate or the ability to learn, but also of a large number of highly specific skills pertaining to particular tasks, situations and objects.

In order to introduce some order in the understanding of the diversity of human skills, many scholars have engaged in a quest for so-called core skills or key competencies. A major project in this respect was the DeSeCo (Definition and Selection of Competencies) project. This project was initiated by the OECD to provide an overarching framework for international skill assessments. Competencies are defined in this project as "the ability to successfully meet complex demands in a particular context through the mobilisation of psychosocial prerequisites (including both cognitive and noncognitive aspects)" (Rychen & Salganik 2003, p. 43). The basic difference between this view and earlier concepts of skills is the holistic nature of the concept of competence. It refers not only to a range of cognitive and social and emotional skills and other prerequisites that need to be in place in order to perform in a competent way, but also to the notion of "orchestration," which is defined as the ability to use these constituent elements in a meaningful and deliberately arranged way. Although the theoretical framework provided by the DeSeCo project injects some welcome theoretical rigor into the discussion of skills measurement, it does not in itself directly give rise to clear recommendations as to which competencies should be measured. The best way to conceive of this overarching framework is to see that it indicates the main underlying competencies that give skills their significance.

The choice of direct assessments in ALL was based not only on these theoretical notions, but also on practical considerations such as an established tradition of measurement, sufficiently compact to be used in a household survey. PIAAC Cycle 1 built on the direct assessments of literacy and numeracy skills in ALL, extending these to the area of problem solving in technology-rich environments. In PIAAC Cycle 2, this latter domain will be replaced by the broader domain of adaptive problem solving skills (Greiff et al 2017). These skills are relevant across the full range of life contexts, from education through work, and further to home and social life, and in interactions with public authorities. People with high levels of these skills are well placed to take advantage of the opportunities afforded by the modern world. Those who lack the skills to deal with the complexity of this world are at risk of losing out (OECD 2012;

Shomos 2010; Hango 2014). Moreover, the importance of key skills such as literacy, numeracy and adaptive problem solving skills and the role they play in people's lives, and in the economy and society in general, is expected to be profoundly affected by a number of major changes that are taking place in the world. The OECD has pointed to three so-called "mega-trends" in particular, namely globalization, technological change and demographic change (OECD 2017, see also Allen & Van der Velden 2013). These changes could potentially result in the reduction and even elimination of whole sectors of employment, and although it is generally expected that they will also give rise to a great number of new jobs and occupations, the concern is that the workers who are being displaced from old jobs will not be well placed in terms of skills to take advantage of these new opportunities (Goos et al 2009). The nature and extent of such shifts is still being hotly debated, with scholars such as Autor (2015) suggesting that they may be overstated. Nonetheless, even such scholars concede that much is still unknown in terms of how these trends will ultimately affect our lives. Whereas until recently the effects looked to be largely confined to areas of work that relied heavily on standardization and routinization, computers and technology appear to be moving more into relatively complex and even abstract non-routine types of work (Berger & Frey 2016). This underlines the increasing importance of recognising adaptive problem solving skills as a key skill set just like literacy and numeracy.

In terms of skills that are not measured in the DA, the pragmatic restriction to those skill aspects that lend themselves well to a survey approach does not necessarily diminish the value of the information gathered. It is important, however, to keep in mind that we are dealing with a subset of the skills possessed by the individuals participating in the survey. Social and emotional skills are not included in the DA, but as will be outlined below, these will be covered to some extent by items included in the BQ. Arguably the most conspicuous omission is in the area of occupation- or industry-specific skills used by individuals in their chosen line of work. Despite the fact that employers often list generic cognitive skills and social and emotional skills as the most important skills required in the workplace, professional expertise is a condition *sine qua non* for success in many occupations (Humburg & Van der Velden 2015; 2017). For example, nobody would doubt that in order to become a good medical doctor, architect or car mechanic, one needs to acquire the domain-specific knowledge and skills that make up the professional domains of these occupations. There is, however, a plethora of specific professional skills. It will not be possible to measure professional expertise directly in the PIAAC assessment, simply because there is no common assessment instrument that allows all different types of professional skills to be measured in a meaningful way for large populations. The absence of direct measures of specific skills underscores the importance of obtaining information on the occupation of working respondents, work experience as well as the level and field of vocational education and training. Since the differences among occupations in the skills measured in the DA are likely to be at least matched and probably eclipsed by differences in level and type of specific skills, the residual occupation-level variance in economic outcomes should provide a rough indication of the economic importance of specific skills relative to the generic skills measured. Although no direct assessment of occupation-specific skills is included in the PIAAC survey, measures of skill use in some more generic work-related areas, as well as in the domains covered by the DA, have been included in the BQ.

Skill use

The DA in PIAAC is limited to relatively few, albeit crucial, skill domains. Yet other skills (e.g. the skills needed to work within teams, to work at multiple and flexible tasks, and to work more independently) have become increasingly relevant in modern workplaces. There is also evidence that some of these skills, like computing skills, were being rewarded in the labour market over and above the returns to the education that people had received (Dickerson & Green

2004). Earlier skills surveys like the International Adult Literacy Survey (IALS) and ALL were mainly limited to the supply side of skills, that is, the stock of skills of the population. It was felt that some information on the demand side for skills was needed as well, that is, on the utilisation of skills in the workplace. Additionally, compared to IALS and ALL, as well as PIAAC Cycle 1, additional questions in the BQ of Cycle 2 of PIAAC can shed light on changing returns to skills in different sectors and occupations. For example, with evidence pointing towards a growing digital divide associated with earnings inequalities between digitalized and non-digitalized firms and organizations across a broad range of sectors and occupations (De la Rica & Gortazar 2017), data on ICT use at work and in private life can help identify at risk sub-populations (OECD 2010).

Scales were developed that measure the use of key skills both at work and in everyday life in a similar way that reflects the current technological developments (e.g. changes in digital devices that are commonly used at work and in everyday life). Items are included for two of the central domains covered by the DA (literacy and numeracy) as well as items pertaining to the use of ICT and digital technology at work and in everyday life. Furthermore, the BQ includes various items to capture the use of interaction/social skills (such as cooperation, influence, managerial skills, self-direction, horizontal interaction and client interaction), and physical skills (stamina and manual skill) at work.

The measures of the use of "job skills" obtained in the BQ will not be direct measures of the "own skill" held by respondents. Discrepancies between job-holders' skills and job requirements are possible, however. Some individuals may have an excess supply of some skills and not be using them fully on the job; others may have insufficient skills for the job they are doing but may survive in the short run despite the consequent poor performance. These mismatches are dynamic: they can appear and disappear as both jobs and people change. In the domains that are also being directly tested, it will be possible to generate indicators of mismatch, where individuals have high levels of own skill and are in jobs where that same skill is used at a low level, or vice versa. There will also be some more general subjective questions on self-perceived skill underutilisation.

Social and emotional skills

PIAAC Cycle 2 will include measures of social and emotional skills by dedicating one section of the BQ (section K) to self-reports of key social and emotional skills. This is done by using a short version of the "Big Five" questionnaire.

The "Big Five" model of personality is currently the most widely used and well-validated framework to measure social and emotional skills. It distinguishes five broad skill domains: *Conscientiousness* characterises the tendency to be organized, responsible and productive. *Emotional Stability* refers to the disposition to remain calm, anxiety-free and in a generally good mood. *Extraversion* describes characteristics such as being outgoing, sociable and assertive. *Agreeableness* denotes the ability to be compassionate and respectful and to cooperate with others. And finally, *Openness to Experience* describes characteristics such as curiosity, aesthetic sensitivity and creativity. Within each of these five broad domains, narrower facets can be distinguished that allow for a more fine-grained level of analysis.

A growing body of evidence from economics and personality psychology attests to the predictive power of social and emotional skills vis-à-vis a broad range of important life outcomes, including academic achievement and attainment, income, health, and social participation (Heckman et al. 2006; Roberts et al. 2007; for a review, see Lechner, Anger &

Rammstedt, forthcoming). This evidence shows that social and emotional skills have *incremental* predictive validity over and above cognitive skills, with effect sizes rivalling or even surpassing those of cognitive skills for some outcomes. Moreover, social and emotional skills are only modestly related to cognitive skills (Heckman & Kautz 2012), including those measured in PIAAC (Rammstedt, Danner & Lechner 2017). This suggests that social and emotional skills can be cultivated relatively independently of cognitive skills. There is some evidence that the returns to social and emotional skills have even been increasing in past decades as tertiary-sector-type professions increasingly require such "soft skills" and employers put increasing value on them (Edin et al. 2017). Moreover, there is evidence that social and emotional skills are not necessarily immutable, as they evolve over the life course and in response to policy interventions (Deming 2017; Kankaras 2017).

Thus, the inclusion of social and emotional skills in PIAAC promises considerable added value and analytical potential. Understanding the complex relations between cognitive skills, social and emotional skills, education and training systems and economic and non-economic outcomes across subgroups and countries is of crucial importance in using the data from PIAAC to draw accurate and effective conclusions to inform policymakers (see e.g. Brunello & Schlotte 2011).

Reporting categories to examine the distribution of skills

In order to effectively address skill deficiencies, but also from the point of view of social equity, it is important to have a good picture of where the deficiencies are concentrated most strongly. Are there population subgroups that appear to be underskilled? To answer these questions, we need to know how skills are distributed among relevant subgroups, as defined in the BQ, for example, by gender, age, socioeconomic background or migration status. These so-called reporting categories are important both from a point of view of equity and efficiency: if skill gaps lead to social and/or economic exclusion, this is not only detrimental to the well-being of the groups involved, but also to the functioning of the economy and society. Because the reasons for skill gaps are likely to be systematically different for different "at risk" groups, the policy measures undertaken are likely to be group-specific. Age is additionally important because both skills acquisition and skills decline are related to age, leading to typical age profiles of skills and skill-related outcomes. Occupation, sector of industry and firm size are needed to detect labour market areas in which skill gaps exist and to assess the extent to which training investments are taking place to reduce these gaps. This and similar information form the basis for directing possible policy interventions to those groups where intervention is most needed. Because highest level of education is assumed to be one of the strongest predictors of skills (see below), and because this is differentially distributed across countries, a breakdown by this variable will be needed for even the most elementary understanding of the results. In addition it is important to know how access to the education system is distributed across different subgroups that are "at risk" from the point of view of skills proficiencies.

Understanding differences in skill levels

From a policy perspective, it is of paramount importance to have a better understanding of those factors that may be related to skill development. This is important not only because it can provide policy levers with which the provision of formal and non-formal organised learning activities like education and training can be rendered more efficient. It can also foster better understanding of why certain subpopulations are exposed to a higher risk of low literacy. This applies not only to factors like education and training, that are relatively amenable to influence

through policy, but also to factors that are less well-defined, because they are incidental to the manner in which people go about their daily lives. Some of these factors take place during education, training, or work, such as learning from supervisors, colleagues or fellow students, or from simply trying new things out at work and learning through trial and error. However, much learning takes place in the personal or private domain of people's lives, through experiences in their childhood home, and in the social or recreational settings in which they spend time outside of work.

While it might seem almost trivial to discuss the effects of education on skill formation in countries, the fact is that much remains unknown about the exact contribution of education, and of the mechanisms through which this is achieved. As was the case for defining and measuring skills themselves, there is not just one but several strands of research pertaining to how individuals acquire and in some cases lose skills over their lifetime. One prominent strand is that of sociological research that points to the social (especially family) environment affecting school choice and educational attainment (e.g. Boudon 1974; Bourdieu 1984; Dronkers 1994). The second strand is educational research, in which scholars have tried to uncover those features of education that are particularly effective in promoting learning (e.g. Glaser 1991). A third strand is that of the economics of education. Since the pioneering work by scholars such as Becker (1964) and Schultz (1963), economists have looked at education, training and other activities undertaken by individuals to improve their level of knowledge and skills as investments in human capital that are expected to yield returns in the labour market (Cunha & Heckman 2007). Fourth, a conceptually related but empirically largely distinct area concentrates on how people continue to learn after leaving initial education. An important focus of this strand of research is on courses, workshops and other forms of training in which employees participate (e.g. Blundell et al. 1999; Desjardins et al. 2006). Finally, this focus on lifelong learning has led to increased attention to the fact that individuals not only acquire skills over their lifetime, but are also confronted with skill loss and a general decline in the ability to acquire and retain new knowledge and skills (e.g. Arthur et al 1998; Flisi et al 2015). In this section we will look at each of these strands of research in turn. A schematic representation of the key mechanisms around skills acquisition and decline is presented in Figure 1 at the end of this section.

The social environment

The opportunities and constraints facing different social groups have been extensively studied by sociologists, who have a long tradition of research looking at the social barriers to education and training. Inequality in access to education related to the family background both in terms of socioeconomic status and migration status is persistent. Part of these differences relate to differences in school performance and learning abilities, the so-called primary effects of social stratification in education (Boudon 1974). These may be caused both by differences in innate abilities as well as differences in socialisation processes (as well as their interaction, as the field of epi-genetics increasingly shows). There is a large and growing body of literature documenting the importance of formative experiences in childhood for later cognitive and social and emotional development (e.g. Cunha & Heckman 2007, Skwarchuk et al. 2014). This is an important insight for many reasons, not least of which is the fact that the brain undergoes cumulative neurological change in the process of acquiring literacy and numeracy skills that cannot be compensated or rewired at a later age (Hinton & Fischer 2010). Such effects can play out in many different ways. There are strong indications of direct learning effects, whereby for example more highly skilled adults influence children's play choices in directions that promote enhanced learning outcomes (Colliver & Arguel 2018).

Even with the same school performance, students from different family backgrounds make systematically different choices in education (the secondary effects of social stratification in education) and given the number of choices that have to be made during the educational career, the cumulative effect of these choices may even overwhelm the primary effects, especially in countries with many educational transition points. These differences in choices relate to differences in social cost-benefit analyses: the social costs and benefits involved in obtaining education are different for students from different social backgrounds. Following an educational career that is different from the one that is common in the family induces social costs, while the social and economic benefits may be lower. Effects can also be more indirect, for example through composition effects in terms of social and ethnic background in schools (Bellin et al 2010; Belfi et al 2016). Biedinger (2010) found that social background and parental involvement explained a large part (though not all) of effects of migrant background on pre-school learning in Germany. As another example, Vogtenhuber (2018) found strong parental education effects on attainment of both educational credentials and skills. Such effects are not necessarily confined to early ages. For example, Stegers-Jager et al. (2015) found strong effects of social background on the clinical performance of medical students, distinct from the effects of past performance (GPA). Also there is evidence that children from single-parent families are disadvantaged in their formal education and skill development (amongst other important outcomes, see e.g. Dronkers 1994), partly because of the more strenuous economic situation of such families, so that it is important to also measure whether both or only one parent were present during a person's childhood. The cultural capital of the family (Bourdieu 1984) also provides a powerful predictor of the school performance.

Finally, while gender inequality in initial education has vanished and actually turned into an advantage for girls in many Western countries, gender inequalities still persist in fields of study, occupational careers and later access to training. This underlines that the gender of the respondent is a key reporting category for PIAAC.

All in all, gender and social background effects on skills could point to potential inefficiencies in educational systems. The BQ includes indicators of gender, cultural capital (parents' education and books in the home), socio-economic background (parents' occupation), absent father and/or mother, migration status, and language used in the parental home. Additionally, given that conditions in the childhood home influence cognitive and social and emotional development, including motivation, it is important to control for childhood conditions in order to estimate corrected (net) effects of formal education and training on skills. Also, given that these concepts refer to the past, their interpretation in causal terms is much more straightforward than for many other concepts measured in PIAAC, making them powerful control variables. Therefore, in the BQ of PIAAC Cycle 2 we have included a number of indicators of the home environment while growing up, including the level of urbanization of the place of residence during childhood, the household composition, the number of siblings, and birth order to serve as exogenous control variables.

Effective learning and instruction

Following a certain type of education or training path does not automatically imply that all students are likely to acquire the same set of skills. Educational research has shown that there is considerable variation among educational systems, schools, study programs and teachers in how much skills students acquire during education or training. A large part of the effect of education on skill development is likely to be indirect, as students are turned into more or less effective learners. In other words, different characteristics of education may affect both the

direct acquisition of skills as measured in the direct assessments, as well as the ability to acquire further skills after leaving education.

Without providing too much detail, we can note a number of interesting approaches here. Situated learning theories (Glaser 1991) emphasise that competencies and competence development are context-specific. They stress the importance of coherence and context-relevance (e.g., real-life experiments, simulation, and practical work experience) in the design of the curricula in order to develop expertise. Active learning theories reject the traditional naïve model of the teacher as the expert, imparting his or her knowledge directly to the student. "Powerful learning environments" (De Corte 1990) and active instructional methods like problem-based learning and project-oriented education are thought to foster the development of generic competencies like problem solving and metacognitive abilities. In addition to these innovative ways of learning based on elaborate theories on how individuals actually learn, educational research has traditionally stressed "time on task" as one of the most important factors affecting student outcomes. That is, the actual time students spent on education (within the classroom and through self-study) is a good predictor of the learning outcomes net of other factors.

As the main antecedent of skills, training and many individual labour market and non-economic outcomes, the reliability, validity, and comparability of measures of educational attainment across populations are of crucial importance for PIAAC. Among the characteristics of the educational career, the achieved level of education is, of course, the most important concept affecting skill levels. More years of schooling, especially in generally rather than vocationally oriented programmes, are expected to have a positive impact on the general skills proficiencies. Moreover, the particular field of education followed will also affect skill levels: graduates from certain fields of education will have higher scores in the literacy domain; others will probably have higher scores in the numeracy domain. Additionally, people self-select into fields of study based on their skills (e.g. people with strong mathematical skills are more likely to choose math-oriented fields). All in all, this also makes field of study measures useful to capture skills that are not measured in the direct assessment.

Next, information about educational pathways (such as additional lower-level qualifications typically completed before, but sometimes also after the highest qualification, as well as non-completed qualifications) is important in order to allow analyses of how the specific pathway taken through the educational system affects the highest qualification eventually obtained, adult skills, training participation and potentially even labour market or other outcomes. This is especially relevant in the light of known path-dependencies in educational careers and life-course development, so that the actual cause for low skills may not lie in low educational attainment, but rather in early educational transitions into programmes less conducive to general basic skill development than other programmes.

It is also important to identify whether the education has been completed outside the host country (in the case of migrants), in order to identify any negative effect on literacy skills, or if the interest is in the outputs of the national education system only.

Education as an investment

In economics, education and learning are treated as an investment. In this view, people are expected to invest in education and learning when the costs are smaller than the future benefits. Not everybody is equally likely to invest in the same amount of education. People differ in the degree in which they enjoy education or learning and in the degree to which they value the

potential benefits of education. Due to heterogeneity in preferences, there will also be heterogeneity in the decision to learn. Borghans et al. (2007) provide a model for investments in education and learning that capture a wide range of potential differences between individuals. First, people differ in their capacity to acquire skills. The costs of education are lower for people who acquire skills more easily because they learn faster. Second, people differ in preferences. They might differ in how they value learning, working and leisure. They might differ in how much they value a high income or other potential benefits of education, and they might differ in how they value future benefits compared to current benefits (time preference, the discount rate) and how they account for risks in outcomes (risk aversion). Third, people might face constraints in their choices. Credit constraints can influence the decision to attend school, but also a lack of facilities for education and less favourable family conditions can be treated as such constraints (Carneiro & Heckman 2002). Finally, the decision to invest in education will depend on information available at the time of investment (e.g. Jensen 2010). If people don't know about the benefits of education, it is unlikely that they will invest.

The main reason it is important to take account of factors expected to influence the willingness to invest in education is that these factors may have a direct impact on skill levels distinct from the indirect effect via the increased level of investment in education. If such factors are not taken into account, estimates of the effect of education on skill levels will be biased. The BQ covers some, but not all, of these factors. The questionnaire contains no direct indicators of innate learning abilities. It does, however, include a number of control variables that are related to this concept, in particular the family background in terms of parents' education, which are exogenous in the sense that they are not the result of choices made by the respondents. Also, the section on social and emotional skills (e.g. measures of conscientiousness and openness to new experiences) may capture personality characteristics that are related to the capacity to learn, and to investment strategies. We also include a measure of patience, which is an important addition to Cycle 2 since it can affect investment decisions.

Furthermore, the BQ of PIAAC Cycle 2 will provide a snapshot of human capital investments by the incidence of non-formal education ("training") during the previous 12-month period. From a policy viewpoint it is important to not only obtain an indication of the volume of investments, but in the case of non-formal education and training, to have information on financing of such investments. A large part of the non-formal education and training efforts are paid for by employers. Since most training received by individuals also benefits other employers (externalities of training) this typically leads to too little work-related training being provided, because part of the returns are captured by outside parties (competing organisations and the individual). From a policy perspective, this could warrant some interventions in the training market to balance out this potential source of underinvestment in training. In addition, knowledge on current investments in training can contribute to the formation of policies designed to provide more equitable or effective inducements to encourage participation among those most in need of further learning. This refers both to differences across different skills levels – Are low-skilled individuals investing enough in their human capital? – and across key reporting categories as specified below. The questionnaire contains indicators of whether the training was followed in working hours (to assess the level of investment by employers in training in terms of opportunity costs), whether the respondent's employer contributed to the costs of training (to assess the level of direct investment in training by employees, employers and other actors), and (reasons for) nonparticipation in learning activities in which the respondent would have liked to engage.

Training and the working environment

If much remains to be learned about the effects and effectiveness of education systems as producers of key skills, this applies even more to other channels that are thought to be related to skill acquisition (and, sometimes, decline). Much of current policy debates on skills focuses on effects of non-formal education (for example organized on-the-job training) (European Commission 2016). Non-formal education is often referred to as (organized) learning or training activities *complementing* formal education.

Non-formal education ("training") is a key factor both for employment and training policies. It is important to understand how skills are gained or maintained and how individuals can prepare themselves for changes in society, such as digitalization (OECD 2013). The investment in training is thus one of the key measures of policy makers to increase skills and competencies in addition to formal education. Adult education and training is today recognized as an essential enabler of economic growth and social development within the rapidly evolving knowledge-based society and economy. Previous research shows that the investment in training has positive effects on individuals in terms of higher employment stability, higher wages and seems to be portable in many cases (Blundell et al. 1999) and positive on the company level in terms of productivity and competitiveness (e.g. Blundell et al. 1999; Bartel 1995). Blundell et al. (1999) report that employer-provided training is related to higher wage returns than off-the job training and its effects are also the most long-lasting. Training may have similar positive effects for those who are not employed, and in various countries training is an important component of active labour market policies.

Regardless of the issue of direct causality, information on correlations between training, skills and outcomes can be highly valuable from a policy perspective. There are strong indications of a so-called "Matthew effect" (Kilpi-Jakonen et al. 2015), whereby training investments fall most heavily on those who already have the greatest endowment of skills. At least part of this effect may be driven by the wish for the greatest returns on investments in personnel, whereby the most skilled workers are given the most demanding work tasks, which drive them to increase their skills even further through training (Allen & De Grip 2012). In this context, understanding barriers to training is important. Previous research shows that cost issues and lack of time (Desjardins et al. 2006) and finding appropriate courses are reported as most important barriers (Rubenson & Desjardins 2009). Human resources practices and job characteristics are the major work characteristics that determine the opportunities for workers to attend training and to learn in an informal way. Although these opportunities are often necessary for actual training participation, a workplace characterised by these training opportunities might not be sufficient. Workers' characteristics will probably determine whether the learning opportunities at work are fully exploited. Personal characteristics such as age, gender, family responsibilities and level of schooling are found to be important determinants of training participation (Bassanini et al 2005).

In addition to measures of participation in non-formal education in the 12 month period preceding the survey and over one's lifetime, the BQ contains questions on recent investments in training (including the main reason for participating in training, crucial for analysing the effects of training), training by supervisors, colleagues, etc., and work autonomy.

Skill acquisition and skill use are not only dependent on total work experience, but also on the specific way in which this experience has been acquired. In addition to total work experience, the number and timing of changes of employer and/or career breaks is therefore also important.

There is probably a certain minimum time one would need to remain with a given employer to have a reasonable chance of learning new things, and the returns to tenure in most jobs are likely to remain positive for at least a few years (although probably not in very low-level routine jobs). Because the new experiences one can expect to be exposed to when working for a given employer are likely to diminish over time, we would expect a certain number of job changes over the career to have a positive effect on learning. Lengthy career breaks comprise periods during which the exposure to (work-relevant) experiences is likely to be limited.

In addition to these direct effects of work experience on learning, there may be indirect effects when work history is interpreted by potential employers as a signal of productivity and learning potential. In that case, a career characterised by frequent changes and/or lengthy interruptions may affect the willingness of potential employers to hire an individual and to invest in his or her human capital. Lengthy periods of unemployment – that is, seeking work without success – may additionally exert a negative effect on individual motivation.

The questionnaire contains a number of questions related to the above-mentioned aspects of employment history, such as information on the total number of years of work experience the respondent has acquired in his or her lifetime and information on the number of different employers worked for in the last five years.

Skill loss

The increased focus on lifelong learning and population ageing in recent years has led to increased attention to the fact that individuals not only acquire skills over their lifetime, but are also confronted with skill loss and a general decline in the ability to acquire and retain new knowledge and skills. An important finding of IALS and ALL was that skill loss was sufficient to offset all of the expected gains from increasing educational quality and quantity. Until now, only scattered studies on different aspects of skills obsolescence have been published. Most of these studies were published in periods in which unemployment was high. This increased the focus on the adverse impact of skills obsolescence for the workers involved. It is interesting that in the recent policy debates on skills obsolescence and "lifelong learning," the main focus has been on the waste of valuable human resources and on the non-optimal performance of workers with inadequate skills. This brings skills obsolescence to the heart of the economic challenge the Western economies face: in realising the transformation towards a knowledge-based society with an ageing population.

On a population level, most cognitive abilities such as memory function, information processing speed and attentional capacity tend to decline with advancing age. Adequate preservation of cognitive abilities is of primary importance to older people, as cognitive decline can result in a loss of productivity among those still working, and a loss of independence and autonomy for retired people. Large individual differences exist in the offset and rate of decline of specific cognitive functions. The theoretical distinction drawn in psychological research between "fluid" and "crystallised" abilities helps to understand these differences. The former refers to functions that involve controlled and effortful processing of novel information (cognitive mechanics), and the latter to the representation of learned skills and access to knowledge (cognitive pragmatics). Fluid abilities are far more sensitive to ageing and both cognitive domains show different developmental patterns across the life span. Fluid abilities typically start declining in the mid-20s, while crystallised skills may improve until and beyond even the age of 70. The distinction between the two is important because the direct assessments in PIAAC will differ in the extent to which they relate to crystallised or fluid abilities. One may

hypothesise that numeracy and literacy skills relate more strongly to crystallised abilities, while adaptive problem solving will relate more to fluid abilities. For adults, the decline in fluid abilities is more likely to strongly hamper their working and everyday life than the decline in crystallised abilities.

Recent advances in cognitive neuroscience have convincingly demonstrated that healthy brains show considerable capacity to compensate for reduced integrity of functional networks or to reorganise existing networks to adapt to changing task demands. The importance of adequate and continued exposure to environmental stimuli during the lifetime is now considered pivotal for optimal conservation of cognitive abilities in old age (conceptualised in the "use it or lose it" paradigm). Arthur et al. (1998) conclude, on the basis of a meta-analysis from the psychological literature on skill decay and retention, that there is substantial skills obsolescence when they are not practiced or used. De Grip et al. (2008) show that job-worker mismatches induce cognitive decline with respect to immediate and delayed recall abilities, cognitive flexibility and verbal fluency. Also, as a result of specialisation, certain knowledge and skills acquired during initial education may get lost. An important question within the broader research domain of lifelong learning and adult education is whether training can help slow down the process of cognitive decline among older populations. Here as well, the findings are mixed. For example, Canduela et al (2012) found that training opportunities decreased with age, but that improved access to training (active aging policies) was a good way to keep older workers engaged in the labour market. However, Flisi et al (2015) found little impact of lifelong learning on cognitive decline among older cohorts.

The BQ should enable insight as to some of the possible causes of skills obsolescence, such as age, health, unemployment, working below one's level, long tenure, and sector of industry.

Institutional factors

Scholars using the PIAAC Cycle 2 BQ to analyse the nature and importance of key skills will benefit greatly from the large-scale comparative nature of the survey, which allows the potential to exploit institutional variation, to distinguish between country-specific and general patterns, to analyse potential heterogeneity of effects across different settings, and to gain more control over selection issues through better identification strategies using system-level characteristics (Hanushek & Woessman 2011; Flisi et al 2015). For example, Hanushek and Woesmann (2011) showed that differences in institutional structures and teaching quality could account for a significant portion of international differences in student achievement. Similarly, Barone and Van der Werfhorst (2011) showed that a large proportion of the effects of education on earnings could be explained by cognitive skills, but that this effect varied widely across countries. Levels, Van der Velden and Allen (2014) showed that the extent to which educational mismatches are explained by skill mismatches varied across countries as a function of an institutional characteristic like employment protection legislation. In a similar way, there is a need to study whether policy and institutions can affect the process of cognitive decline. It is well established that early retirement decisions are largely driven by institutions. Gruber and Wise (2004), for example, show there is a very strong cross-country relationship between retirement rates and government policy. If keeping workers active can postpone cognitive decline, there is an important role for policies that increase labour market participation of older workers. Although institutional factors are not measured directly in the BQ, researchers can combine the information from the BQ with a wide range of external sources to examine the role of institutions. Examples of strategies that can be used to achieve this are given below in the section on 'Limitations of the BQ'.

Understanding the relation between skills and outcomes

Ultimately, the importance of skills lies in their relation to relevant outcomes. In addition to economic outcomes such as employment opportunities and rewards in the labour market, it is important to take account of outcomes of societal importance in other areas that may also be influenced by skills, such as health status, voluntary work, and political engagement. A schematic representation of the key relationships between skills and outcomes is presented in Figure 2 at the end of this section.

Labour market outcomes

Cognitive skills are a key determinant of an individual's productivity, and therefore it is not surprising that cognitive skills are related to economic success. There is a large body of evidence showing that higher cognitive skills are associated with better labour market outcomes (e.g. Heckman et al., 2006). The BQ therefore needs to cover a considerable number of measures relating to wages, labour market participation and status, and job characteristics.

For those currently or recently in work, several important labour market outcomes are included in the questionnaire, including working hours, individual earnings, job security, occupational status, and the quality of the match between education and work.

One of the interesting questions in this respect regards the precise role of education and skills in producing these outcomes. There are rivalling hypotheses on this point. Very often the strong relation between education and labour market outcomes is explained in terms of human capital theory (Becker, 1964), which claims that people with more years of schooling earn more because the competencies they acquired in education have made them more productive. While this is probably true to some extent, at least in the aggregate, it tells only part of the story. Scholars such as Spence (1973) and Arrow (1973) have pointed out that the selection, allocation, and rewarding of individual employees takes place on the basis of signals such as formal qualifications as well as on the basis of productivity. This is usually explained in terms of incomplete information and bounded rationality. The signals form a solution to this problem, as they are assumed to indicate the average productive capacities of the group to which they refer. The labour queue theory (Thurow, 1975) adds an interesting twist, pointing out that many relevant competencies are not even learned in education, but picked up through work experience on the job. According to this theory, education is an indicator of low training costs rather than high productivity. Finally, some scholars have questioned whether education has any effect at all on graduates' ability to perform, pointing out that this relationship is in fact weaker than that between education and reward (Bills, 2003). This has led credentialists such as Collins (1979) to claim that higher education does not lead to superior competencies but is used by "gatekeepers" to legitimise the rationing of access to high-status, highly paid jobs.

In reality, there is probably an element of truth in all these theories. The crucial point then comes down to specifying the contexts under which one or the other mechanism prevails. Many studies have focused on identifying "sheepskin" effects, so called because the effects are thought to be partially if not wholly attributable to the possession of diplomas (which used to be written on sheepskin). Barrett (2011) found that only a third of the return to an extra year of education in Australia could be attributed to cognitive skills (significantly however, the skill gap accounted for fully half of the wage disadvantage of migrants from non-English speaking countries). Flisi et al (2015) found that educational attainment has generally stronger effects on labour market outcomes than skills, although in some countries the opposite appears to be true. Levels, Van der Velden and Allen (2014) show that only a part of the effects of required

education on wages can be attributed to differences in skill proficiency, but the extent to which skills mediate this effect differs with institutional characteristics: it is smallest in countries with a high level of employment protection legislation. Similarly, Vogtenhuber (2018) found that workers' occupational status was strongly associated with the highest educational qualification obtained, and only to a lesser extent on worker skills. Olfindo (2018) found similar sheepskin effects for tertiary educated workers in the Philippines. Lancee and Bol (2017) found that, although foreign education is associated with significant wage penalties, only a third of this effect is explained by skills. In interpreting the results of all of these studies, it is important to keep in mind that education aims to impart a broader range of skills than just those measured in surveys such as PIAAC. Nonetheless, the evidence seems to point to varying degrees of credentialism in labour markets.

Nevertheless, there are also strong indications for strong direct effects of skills on economic outcomes. Shomos (2010) found good prospects for enhancing the Australian working-aged population's employment chances and wages by improving literacy and numeracy. Van der Velden and Bijlsma (2018), using PIAAC Cycle 1 data, show that the effects of skill mismatch on wages are almost as large as the effects of educational mismatch.

For policy makers it is crucial to be able to distinguish between 'true' effects of skills from effects that result from credentialism. Many of the control variables that are needed to get unbiased estimates of the effects of skills on economic and social outcomes are comparable to the ones discussed above on the effect of education and training on skills development, although education and training will now be treated as control variables instead of the predictor of interest. As indicated above, the highest level attained in formal education is one of the strongest predictors of skills. This is not only interesting in its own right, as a skill predictor or reporting category, but will likely be a confounding variable for many of the issues that policymakers are trying to understand in the context of PIAAC. Level of education is also a strong predictor of economic and social outcomes, and although this is often assumed to reflect differences in skill levels between levels of education, the precise causal mechanism is still somewhat controversial (are the effects all directly attributable to human capital, or do theories of signaling and credentialism also tell part of the story?), and the residual effects of the level of education are a combination of sheepskin and unmeasured skills (e.g. Heckman & LaFontaine 2006). For example, school completion is probably used by employers as a proxy for social and emotional skills. In this respect it is not only important to register highest formal level (which can be translated into number of years of formal schooling), but also register additional qualifications that may have been attained as well as uncompleted schooling. Even more important for getting unbiased estimates of skills on potential outcomes is to identify exogenous sources of variation that might affect the level of schooling. Variables that have been identified in the literature relate to family characteristics that induce exogenous variation in the resources that are available like birth order, number of siblings, and geographical location when growing up (Angrist & Evans 1998; Bertoni & Brunello 2016; Brunello & Da Paola 2013; Conley & Glauber 2006). Such variables have been successfully applied to identify the effects of schooling.

In addition to level of education, labour market studies show large and robust differences in economic outcomes between fields of study in tertiary and secondary vocational education. Arts and humanities and social sciences often perform poorly, while business and engineering studies often do better than average. From a policy point of view, it is important to establish whether these differences are due to differences in the supply of and/or the demand for the skills

of the graduates of these programs, to signaling or credentialism, to individual preferences, or to other factors.

The variables related to training are not only relevant in predicting skills, but also in predicting economic outcomes (controlling for skills). Some studies suggest that the purported effects of training may be overstated due to design issues. For example, Hinerasky et al (2014) found a strong wage effect of training participation, which however vanished completely after the control group was restricted to employees who were offered training but ultimately declined to participate. Ehlert (2017) found patterns of effects of training that strongly emphasized the importance of labour market structure, and which were more consistent with job competition and credentialist models than with the human capital model of skills production through training. Blundell et al. (1999) report that employer-provided training is related to higher returns than off-the job training. As indicated above for education, the precise mechanism is not known and the estimates of the returns to training are biased by heterogeneous selection into training. For example, some people might get training because they are expected to be promoted instead of the other way around. We need good control variables like firm size to control for this unobserved heterogeneity. Most of these control variables are the same as the ones we discussed above. Additionally, when estimating effects of education and skills on outcomes, it is important to control for background characteristics (e.g. socio-economic status of the family, migration status, and cultural capital).

Non-economic outcomes

Skills are not only important for economic outcomes, but also for other outcomes such as well-being, health, and civic participation. As pointed out by the OECD's Working group on non-economic outcomes (OECD 2016), there has been a push from researchers and policy makers in recent decades for more direct measures of societal and individual well-being, so as to avoid the risk of a too one-sided assumption that as long as individual wealth and income and GDP at the societal level are growing, all is well. For this reason, the Cycle 2 BQ has added a question on general life satisfaction, which, in addition to the existing measures of political efficacy, social trust, voluntary work and general subjective health already contained in Cycle 1, helps to provide a more complete picture of the wide range of economic and non-economic outcomes that are related to skills. There are already a range of interesting studies available, relating education and/or skills to a wide range of outcomes, such as obesity (Benson et al 2018), health-related labour market participation (Cai 2010), and management of a HIV medication regimes (Waldrop-Valverde et al 2010). The extended set of non-economic outcome measures in PIAAC Cycle 2 creates unique opportunities for enriching and deepening analyses of such questions, as well as opening up potential new avenues of research. For example, it will make it possible to examine the role of specific cognitive and social and emotional skills on well-being, how well-being may affect the link between education and health, and through which potential mechanisms well-being can affect labour market outcomes.

Figure 1: Schematic Representation of Skill Acquisition and Decline

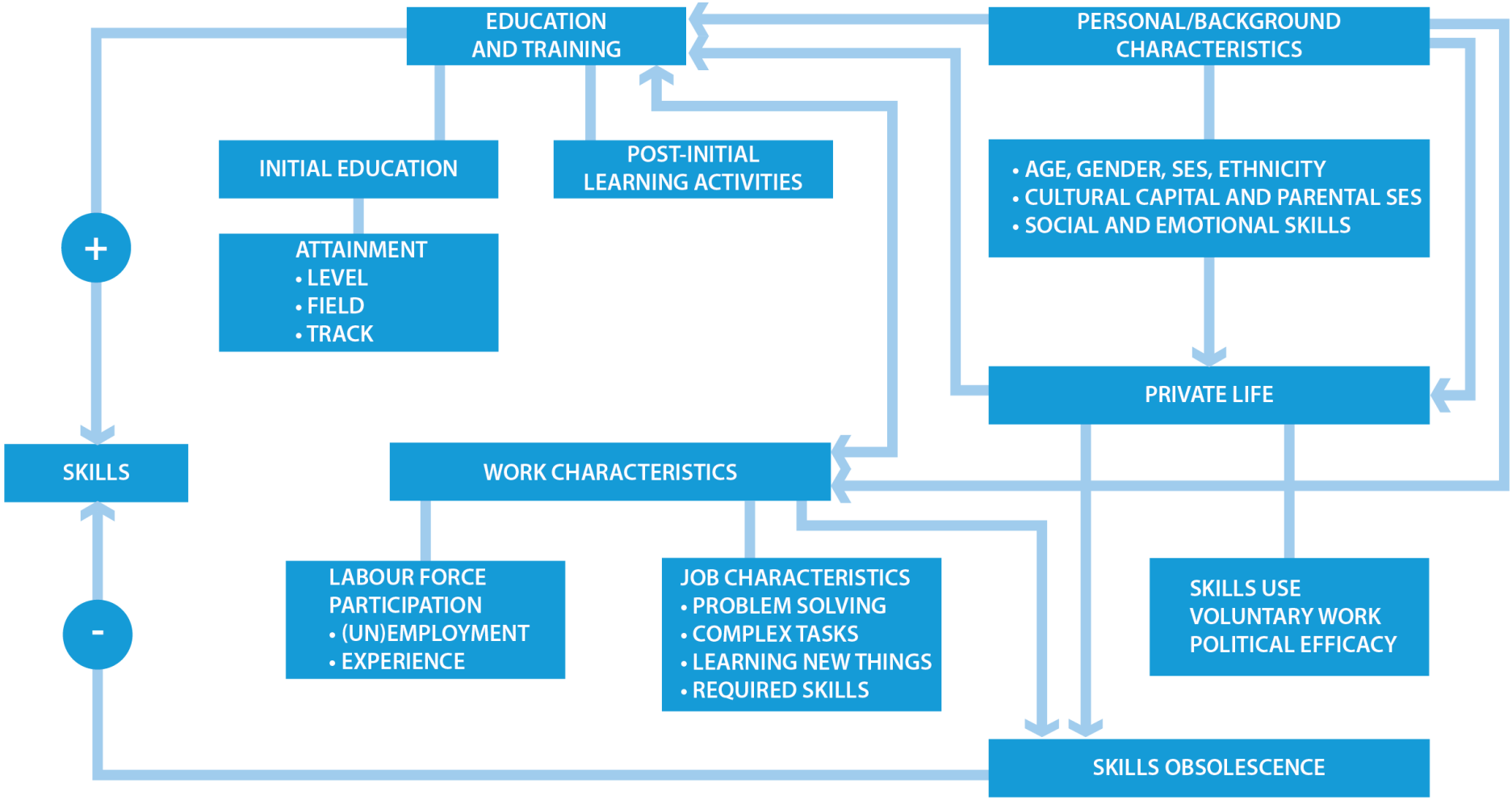
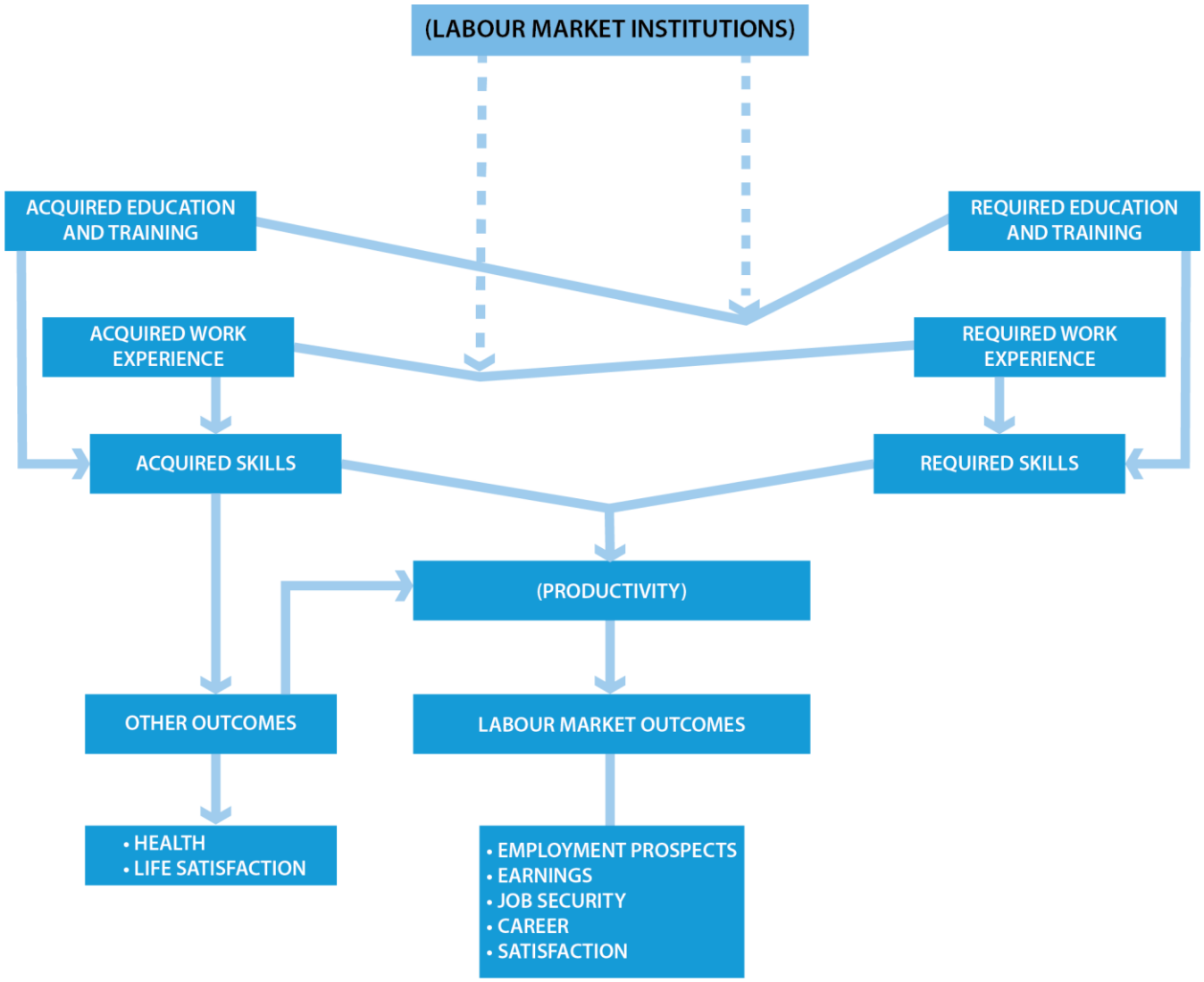


Figure 2: Schematic Representation of the Relationships between Skills and Economic and Social Outcomes



Limitations of the BQ for PIAAC Cycle 2 and how to deal with them

As outlined above, the BQ is of crucial value in making PIAAC Cycle 2 a unique data set for the analysis of the distribution, determinants, and outcomes of skills across countries. However, it is also important to acknowledge the limitations of the BQ (and the PIAAC design more generally), and to highlight strategies for dealing with these limitations.

Most importantly, PIAAC uses a cross-sectional design, which limits the potential for causal analysis compared to data sources that rely on panel designs. Additionally, to keep participation in the study manageable for respondents, the average time needed to complete the BQ cannot exceed 45 minutes. As a result, although the BQ covers detailed measurements of a wide range of concepts across multiple domains, other concepts that could have also been of interest (e.g. additional economic and non-economic outcomes of skills) could not be included. Finally, there are restrictions to the types of questions that could be included in the BQ. For example, asking more detailed questions on parental behaviour during childhood would be difficult because responses would be affected by recall bias. Given the cross-national focus of PIAAC, the BQ is limited to questions which are appropriate across the participating countries, which means that questions which could have been relevant for some countries are not included.

Nonetheless, despite these limitations, PIAAC Cycle 2 is still expected to be extremely valuable in further advancing policy and research on skills. PIAAC Cycle 1 (which faced similar limitations) has already generated an overwhelming array of insights. This was partly a result of the innovative and creative strategies that were employed to overcome the limitations of PIAAC. Most importantly, research using PIAAC Cycle 1 has shown that the strengths of PIAAC can be further leveraged effectively by using the data in conjunction with other data sources.

A first and relatively straightforward way to achieve this is to match PIAAC data with existing data sources at the macro or meso level. For example, data on respondents' professions and occupational sectors can be combined with contextual data at the level of sectors or occupations. This is facilitated by the availability of detailed (2-digit ISCO) information on professions and occupational sectors in the public use file of PIAAC. As such, further characteristics of professions and occupational sectors can be brought into analyses of the PIAAC data. Similarly, through existing data sources for country-level information (e.g. from the OECD and Eurostat), factors at the national level (e.g. institutional characteristics of educational systems and labour markets) can be used to complement the individual level data in PIAAC (see e.g. Levels et al. 2014).

Secondly, it is possible to create synthetic cohorts by comparing multiple data sets over time. This approach has already been applied successfully in analyses of the Trends in International Mathematics and Science Study (TIMMS) and PISA data (e.g. Hanuschek & Woessmann 2011). Similar comparisons of cohorts over time could be constructed with the PIAAC data from Cycles 1 and 2, potentially combined with the IALS and ALL data.

Finally, the strengths of the PIAAC data can be further enhanced by complementing the data with other individual level data sources within countries. As a key example, in Scandinavian countries and the Netherlands the PIAAC data can be matched with register data, which opens up unique opportunities for adding a longitudinal component by using information on respondents that was gathered before and after their participation in PIAAC. Related to this, in several countries it is possible to combine the PIAAC data with information on respondents'

place or region of residence. This information can also be used to facilitate causal analyses based on the PIAAC data. For example, Falck et al. (2016) have used information on regional differences in the introduction of broadband connections to estimate the effects of ICT skills on wages. Finally, in Cycle 1, some countries even chose to turn the PIAAC data collection to a first wave of a national panel data collection.

4. The structure of the BQ

The BQ is organized in 11 modules, each of which covers one or several substantive domains. In this section we present a concise outline of these modules, with a brief description of the focus of each module. A detailed overview of the modules, including definitions/operationalizations and rationales for each concept, can be found in Appendix 1.

Module A: Personal characteristics

Module A covers a set of questions relating to respondents' socio-demographic background. More specifically, this module captures respondents' gender, age (based on year and month of birth), country of birth of the respondent and both parents, languages learned and spoken at home. As such, this module contains a number of important reporting categories that could be used in analyzing the distribution of skills, and control variables for analyses of determinants and outcomes of skills.

Module B: Education and training

This module covers both formal and non-formal education and training. For formal education, the module includes measures of the highest level of education, other qualifications obtained ("educational pathways"), qualifications respondents are currently studying for, educational qualifications the respondent started studying for but did not in the end obtain ("dropout"), and field of study for highest and current education. As highlighted in Section 3, the highest completed level of formal education, is one of the most central variables in the BQ, used both as a predictor of adult skills and labour market outcomes and as a key control and reporting variable. Non-formal education and training is defined as any organised educational activity outside the established formal education system. It encompasses forms of learning that are intentional, and includes learning activities occurring at work, in the family or in daily life. Module B includes a range of measurements of non-formal education and training, such as incidence, intensity and some characteristics of training, costs and motivation for training, content of training, and barriers for participating in training.

Module C: Current status and work history

This module provides key information in terms of the labour force status and work history of respondents, which is not only crucial information in its own right, but plays a key role in the subsequent routing within the BQ. Most importantly, this module comprises questions on current paid and unpaid work, recent job search, reasons to not search for work, self-assessed current situation/employment status, and basic employment history.

Module D: Current job

This module provides the key descriptive indicators of the jobs held by those currently in employment. For example, this module covers indicators of labour market outcomes such as occupation, sector of industry, tenure, working hours, job satisfaction, and earnings. A second tier of indicators provided by this module includes the required education and education-job match, required experience, supervision duties (needed in any case as input for occupational coding), firm size, and contract type.

Module E: Last job

This module covers key descriptive indicators of the last job for respondents who are currently not in employment, in a similar way as in Module D. Additionally, in this module respondents are asked for the main reason why they stopped working in their last job.

Module F: Literacy, numeracy, and ICT practices at work

The primary purpose of this module is to provide input for a number of scales to measure skill use at work in the domains covered by the direct assessment, as well as use of ICT skills. The measures of skill use that were chosen reflect the modes of reading, writing, numeracy, and ICT use in modern work organisations, and have been attuned as closely as possible in substantive terms to the assessment instruments used to measure proficiency in the relevant domains.

Module G: Literacy, numeracy, and ICT practices in everyday life

This current module partly mirrors the module on skill use at work, both in terms of items and of structure. As in Module F, measures of skill use in everyday life have been chosen that reflect the demands of modern society, and take into account recent technological developments. However, given that the activities undertaken in work settings systematically differ from those undertaken outside of work, the scales for work and everyday life are not fully identical. Additionally, this module includes items measuring whether people use digital devices such as smartphones, tablets, and laptops, and how regularly they use these devices.

Module H: The working environment

This module covers a range of concepts relating to respondents' working environment. This includes measures of self-reported skill mismatch, as well as the included scales for characteristics of the job (e.g. coordination, work intensity, influence, collective work, client interaction, social support, appraisal, and perceptions of change) and questions on learning in the job.

Module I: Non-economic outcomes

This module focuses on non-economic outcomes of skills, and contains measures for subjective wellbeing and health, generalized trust, voluntary work, political efficacy, and patience. As such, this module enables analyses of relationships between skill measures in various domains and a range of non-economic outcomes.

Module J: Background

This module covers additional questions on respondents' socio-demographic background, but in contrast with Module A the focus here is on respondents' partners and children, and on their childhood experiences. More specifically, this module includes measures of household size and composition, employment status of spouse or partner, number and age of children (if any), educational attainment and occupation of respondents' parents, books in the home, and household composition and place of residence while growing up. Like Module A, Module J therefore provides a range of important reporting categories and potential (especially exogenous) control variables that could be used in the analysis of the distribution, determinants, and outcomes of skills.

Module K: Social and emotional skills

Finally, Module K covers social and emotional skills. As discussed in Section 3, social and emotional skills describe social skills, self-regulatory abilities, and individual characteristics such as intellectual curiosity or interests. Such skills have emerged as powerful determinants of economic and non-economic outcomes above and beyond cognitive skills. A parsimonious and well-validated self-report instrument measuring the Big Five personality traits will be used to measure five broad skill domains: Conscientiousness, Emotional Stability, Extraversion, Agreeableness and Openness to Experience.

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Appendix 1: Detailed Overview of the BQ Sections

Criteria for inclusion of concepts and items

For the inclusion of concepts and items in the BQ, the following criteria were used:

1. The concepts should have a clearly established relation to skills and determinants or outcomes of skills in the theoretical and empirical literature.
2. Items must have good measurement properties in terms of reliability and validity and, ideally, be able to maintain that over time.
3. Items (or the resulting harmonized variables) must have comparable meaning across groups and across countries, after careful translation and adaptation. This poses limits to concepts that do not exist across cultures, or that are vulnerable to cultural bias.
4. Where possible, items should be comparable with other international surveys. Most important is the comparability to PIAAC Cycle 1, but comparability with other international surveys is important as well. Comparability with PIAAC Cycle 1 should be as strict as possible, with identical questions being preferred unless changes are demonstrably needed.
5. Most questions should be asked to everybody, or at least to a majority of the respondents. The number of items for small subgroups should be minimised.

Section A: Personality characteristics

Age

Concept definition and operationalization:

Age will be derived from the respondent's year and month of birth.

Concept rationale:

"Age" is a basic parameter in survey data analysis since the differences between the population groups constructed on it are relevant in developing many international and national public policies and programs. It is also required for the analysis of skill loss related to ageing.

Question(s):

A2_Q01

Sex

Concept definition and operationalization:

Sex refers to the biological sex of the person. According to the World Health Organisation (WHO), "sex" refers to the biological and physiological characteristics that define men and women, while "gender" refers to the socially constructed roles, behaviours, activities, and attributes that a given society considers appropriate for men and women. Following this description, WHO considers that "male" and "female" are sex categories, while "masculine" and "feminine" are gender categories (based on Eurostat, 2007).

Concept rationale:

The need for adequate information on the situation of women and men in all policy areas is generally recognised.

Question(s):

A2_N02

Country of birth

Concept definition and operationalization:

Country of birth is the country where a person was born, that is, the country of usual residence of mother at the time of the birth. Country of birth will be classified on the basis of the UN Statistical Division, Standard Country or Area Codes for Statistical Use. ST/ESA/STAT/SER.M/49/Rev.4/ (based on Eurostat, 2007).

Concept rationale:

This item will identify migrants to a country and will permit analyses comparing the circumstances of migrants to native-born residents.

Question(s):

A2_Q03a,b

Year of immigration

Concept definition and operationalization:

Year in which respondent immigrated to country of destination.

Concept rationale:

Year of migration is an individual attribute that helps to profile the distribution of skill within countries. It can be thought of as an antecedent variable to skill acquisition and can be used to identify a subpopulation for which the profile of skill acquisition can be specifically examined. Furthermore, it can be used to examine differential returns to skill acquisition. This item complements the variable on the country of birth as it will provide an indication of the age at which respondents immigrated and will make the identification of recent immigrants possible.

Question(s):

A2_Q03c1,2

Mother's and father's country of origin

Concept definition and operationalization:

We will distinguish whether the mother and the father were born in the host country or not, which is needed to distinguish between first and second generation immigrants.

Concept rationale:

Whether parents were born in the country will provide us with some indication of their immigration status and therefore the respondent's exposure to the literacy culture of the country during childhood.

Question(s):

A2_Q03d, A2_Q03e

Linguistic familiarity

Concept definition and operationalization:

Linguistic familiarity aims to measure the extent to which respondents are familiar with the test language, based on whether it was the language they first learned in childhood, whether it is the language spoken at home.

Concept rationale:

Linguistic familiarity is an individual attribute that helps to profile the distribution of skill within countries. It can be thought of as an antecedent variable and predictor of skill acquisition.

Question(s):

A2_Q04

A2_Q05

Section B: Education and training

Subsection on formal education

Section B of the BQ includes a number of questionnaire items referring to formal education[1], namely educational attainment, other past education completed, current participation in education, and non-completed education. The International Standard Classification of Education (UNESCO Institute for Statistics 2012, paras.36–38) defines '**formal education**' as follows:

> 36. Formal education is education that is institutionalised, intentional and planned through public organizations and recognised private bodies, and – in their totality – constitute the formal ***education system of a country***. Formal education programmes are thus **recognised** as such by the relevant national education or equivalent authorities, e.g. any other institution in cooperation with the national or sub-national education authorities. Formal education consists mostly of initial education (see Paragraph 37). **Vocational education**, **special needs education** and some parts of **adult education** are often recognised as being part of the formal education system. Qualifications from formal education are by definition recognised and, therefore, are within the scope of ISCED. Institutionalised education occurs when an organization provides structured educational arrangements, such as student-teacher relationships and/or interactions, that are specially designed for education and learning.
> 37. Formal education typically takes place in educational institutions that are designed to provide full-time education for students in a system designed as a **continuous educational pathway**. This is referred to as **initial education**, defined as the formal education of individuals before their first entrance to the labour market, i.e. when they will normally be in full-time education.
> 38. Formal education also includes education for all age groups with programme content and qualifications that are equivalent to those of initial education. Programmes that take place partly **in the workplace** may also be considered formal education if they lead to a qualification that is recognised by national education authorities (or equivalent). These programmes are often provided in cooperation between educational institutions and employers (e.g. **apprenticeships**).

The main characteristics of formal education are thus that it is hierarchically structured, provided in schools, colleges, universities or other educational institutions and leads to a certification. "According to the ISCED definition, formal education can be seen as a complex ladder of education where recognised completion of one level gives access to another higher level of complexity" (Eurostat 2016, p.18).

Educational attainment

Concept definition and operationalization:

Educational attainment[2] refers to the highest educational programme successfully completed by an individual. "In formal education, successful completion usually results in a qualification that is recognized by the relevant national education authorities" (UNESCO Institute for Statistics 2012, para. 57). The main indicator for educational attainment is the highest educational qualification obtained by the respondent (not just the completion of individual courses or modules that are part of an educational program). "In ISCED, the term 'qualification' is synonymous with 'credential'. Other terms such as 'certificate', 'degree' or 'diploma' are types of qualification and are treated as being synonymous with each other within ISCED" (UNESCO Institute for Statistics 2012, para. 21). "Education programmes at ISCED levels 1 and 2 (and occasionally at ISCED levels 3 or 4) do not always conclude with a qualification. In these cases, other criteria in place of qualifications should be used to determine successful completion; for example, having attended the full final year of the programme or having access to a higher level of education" (UNESCO Institute for Statistics 2012, para. 58). For these programmes (or, in the case of programmes spanning two or more ISCED levels, for completed stages of programmes), indicators are: fulfilled attendance requirements (enrol and regularly attend through the final year of a stage or programme); and/or demonstrated acquisition of expected knowledge, skills and competencies, typically shown by passing a final, curriculum-based examination or series of examinations, or accumulating the specified number of study credits.

Information on educational attainment is coded using an international coding scheme based on ISCED 2011 (UNESCO Institute for Statistics 2012), distinguishing the following categories (for further details, check the "PIAAC Cycle 2: Background Questionnaire Harmonization and Extension Guidelines"):

0. Less than primary
1. Primary

[1] We use the term 'formal education' here as a shorthand for what is often referred to as 'formal education and training'.

[2] For further details, see OECD, & Eurostat. (2014). Joint Eurostat-OECD guidelines on the measurement of educational attainment in household surveys. Retrieved from http://ec.europa.eu/eurostat/documents/1978984/6037342/Guidelines-on-EA-final.pdf

2. Lower secondary nfs
3. (Pre-)Vocational and lower track general lower secondary
4. General lower secondary (higher or single track)
5. Vocational short upper secondary <2 years
6. General short upper secondary <2 years
7. Upper secondary nfs
8. Vocational upper secondary ≥2 years, access to 3 only (partial level completion)
9. General upper secondary ≥2 years, access to 3 only (partial level completion)
10. Vocational upper secondary ≥2 years, access to 4 only
11. General upper secondary ≥2 years, access to 4 only
12. Vocational upper secondary, access to 5/6/7
13. General upper secondary, access to 5/6/7
14. Post-secondary non-tertiary nfs
15. Vocational post-secondary, access to 4 only
16. General post-secondary, access to 4 only
17. Vocational post-secondary, access to 5/6/7
18. General post-secondary, access to 5/6/7
19. Sub-degree level nfs
20. Vocational sub-degree level
21. General sub-degree level
22. Bachelor's level nfs
23. Professional Bachelor's level
24. Academic Bachelor's level
25. Master's level nfs
26. Professional Master's level
27. Academic Master's level
28. Doctoral level

Concept rationale:

Educational attainment is the single best predictor of general basic skills, labour market outcomes and certain other life outcomes such as health. A higher level of education generally creates more favourable employment prospects and consequently opens up the possibility for better living conditions. For young people, educational attainment plays an important role in their start in adult life because of the increasing need for advanced both general and vocational skills in today's economy. While general education specifically aims at developing the general basic skills that are measured in PIAAC, vocational education aims at developing occupation-specific skills, which are not measured in PIAAC. General and vocational education also often have different effects on labour market and other life outcomes. When measuring educational attainment, it is thus important to distinguish general and vocational education at all relevant levels of education. In addition, given the expansion of education over recent decades and stagnant labour markets in some economies, overeducation is important to be monitored. The populations' level of education is also a critical factor for the (knowledge) economy and society.

Question(s):

B2_Q01

Educational pathways

Concept definition and operationalization:

Educational pathways refer to the sequence and timing of educational programmes attended or completed by the respondent. Due to time constraints, PIAAC Cycle 2 will only collect information on qualifications obtained, excluding the highest, without timing information. The indicator for educational pathways is thus all other qualifications that respondents have obtained, besides their highest level of education. We use the same lists of qualifications as in B2_Q01, and the country and adaptation instructions of this item also apply here.

Concept rationale:

By asking respondents about other qualifications they have obtained we can gain insight into educational pathways that respondents have taken, which may have an impact on adult skills, labour market and/or non-economic outcomes. For example, respondents who completed vocational rather than general upper secondary education before enrolling in tertiary education may have lower general basic skills than respondents completing general upper secondary education, because of the different orientation of their prior schooling.

Question(s):

B2_Q02a,b

Highest qualification obtained abroad

Concept definition and operationalization:

If highest qualification is gained in survey country, and if not, in which country the highest qualification was obtained.

Concept rationale:

The value of the qualification in the labour market and its impact on skills may be different for foreign and domestic qualifications. For analyses focusing on the output of national education systems, it will also be necessary to exclude respondents with foreign qualifications from the analysis sample.

Question(s):

B2_Q03a,b

Field of study highest qualification

Concept definition and operationalization:

The field of study of the highest level of formal education completed, coded into broad fields of education and training based on ISCED 2013:

1 Economics, Business and Administration (e.g. retail, commerce, finance, office administration, marketing, accounting, insurance)
2 Law (e.g. labor law, paralegal training)
3 Health (e.g. medicine, nursing, paramedical, pharmacy, dental studies, veterinary, psychiatry)
4 Welfare (e.g. social work, youth work, elderly care, child care)
5 Social and Behavioral Sciences (e.g. political science, psychology, cultural studies)
6 Journalism and Information (e.g. communication science, library studies, museum studies)
7 Information and Communication Technologies (ICT) (e.g. computer programming, software development, network design, database administration, informatics, computer science)
8 Natural Sciences, Mathematics and Statistics (e.g. biology, earth sciences, chemical lab assistance)
9 Engineering and Manufacturing(e.g. electronics, car mechanics, tool making, mining)
10 Construction (e.g. architecture, masonry, plumbing)
11 Agriculture, Forestry, Fisheries and Environmental Studies (e.g. farming, horticulture, animal care, environmental protection)
12 Personal and Community Services (e.g. hairdressing, hotel, sports, tourism, cooking, waste management, cleaning, sewing, domestic science, ergonomics)
13 Security and Transport (e.g. police, army training, air traffic control, postal service, crane and truck driving, transport studies)
14 Education and Teacher training (e.g. remedial teaching, teaching assistant, education science, didactics)
15 Humanities, Languages and Arts (e.g. history, translation, music, graphic design, printing, handicrafts)
16 No main area of study or emphasis, it was a general education programme (e.g. liberal arts)

Concept rationale:

Prior research has shown large differences in labour market outcomes between fields of study. Adding this question allows us to establish whether this may be linked to skills. While the focus has often been on assessing the effect of level of education on skills, it is very likely that field of study has an important impact as well. We may expect that graduates in technical/science score better on math and problem solving while graduates in humanities score higher on literacy. However, in the absence of panel data, this cannot be interpreted in a causal way because individuals will also choose fields of study based on their skills.

Question(s):

B2_Q04a

Year obtaining highest education

Concept definition and operationalization:

The year or age the respondent obtained their highest level of education.

Concept rationale:

The year the respondent obtained their highest level of education is an important marker as it defines the time the respondent may have entered the labour market. Combined with the information on how many years respondent has worked, we are able to identify whether there are any gaps between the time of completing the highest level of education and the time of starting work, and/or whether the respondent has worked before or during education.

Question(s):

B2_Q04b

Current participation in formal education and qualification studied for

Concept definition and operationalization:

Current participation in formal education (see definition above) refers to the educational programme a respondent currently attends. There is no reference to successful completion. In order to avoid developing separate response lists for educational programmes and qualifications, this question is worded in such a way that the indicator of educational qualifications can be used. The qualification the respondent is studying for will however sometimes correspond to a higher level of education than the respondents' actual current enrolment (e.g. a student in grade 9 of high school, thus enrolled in ISCED level 2, studying towards a high school diploma, i.e. ISCED level 3).

Information on the qualification currently pursued is coded using an international coding scheme based on ISCED 2011 (UNESCO Institute for Statistics 2012), distinguishing the following categories (for further details, check the "PIAAC Cycle 2: Background Questionnaire Harmonization and Extension Guidelines"):

1. Primary *(this category can be dropped by countries not having any such programmes for the PIAAC population)*
2. Lower secondary nfs
3. (Pre-)Vocational and lower track general lower secondary
4. General lower secondary (higher or single track)
5. Vocational short upper secondary <2 years
6. General short upper secondary <2 years
7. Upper secondary nfs
8. Vocational upper secondary ≥2 years, access to 3 only (partial level completion)
9. General upper secondary ≥2 years, access to 3 only (partial level completion)
10. Vocational upper secondary ≥2 years, access to 4 only
11. General upper secondary ≥2 years, access to 4 only
12. Vocational upper secondary, access to 5/6/7
13. General upper secondary, access to 5/6/7
14. Post-secondary non-tertiary nfs
15. Vocational post-secondary, access to 4 only
16. General post-secondary, access to 4 only
17. Vocational post-secondary, access to 5/6/7
18. General post-secondary, access to 5/6/7
19. Sub-degree level nfs
20. Vocational sub-degree level
21. General sub-degree level
22. Bachelor's level nfs
23. Professional Bachelor's level
24. Academic Bachelor's level
25. Master's level nfs
26. Professional Master's level
27. Academic Master's level
28. Doctoral level

Concept rationale:

Education is the single best predictor of skills acquisition. Additionally, those currently in education have a higher expected level of skill than their highest completed qualification would suggest. Looking at people who are currently in education provides a unique opportunity to assess the effect of educational experiences on the scores in the DA. In that sense, PIAAC will provide a valuable addition to PISA. Where PISA focuses on 15-year-olds, PIAAC can provide some dynamic views by focusing on the 16- to 25-year-olds who are still in education (even though this information will be collected for all respondents, including those above age 25). This will provide answers to questions such as: are skills positively associated with age, while still in education? How are the skills affected by differences in educational experience?

Question(s):

B2_Q05

Incomplete education

Concept definition and operationalization:

Incomplete education ("dropout") refers to educational programmes attended but not completed. Due to time constraints, PIAAC Cycle 2 will only collect information on one programme the respondent dropped out of (if there are more than one), namely the last.

Concept rationale:

In addition to education successfully completed and current participation in education, it is important to have an idea of investments in education that were not successfully completed. From the point of view of human capital theory, such investments should also contribute to increasing skill levels, although the fact that the level was not completed would suggest that a lower level of skills can be expected to have been acquired compared to an otherwise similar person who did complete the level in question. At higher levels of education, this will often rather apply to the specific skills taught in the programme in question than general basic skills.

Question(s):

B2_Q06

Subsection on non-formal education

After the subsection on formal education, section B of the BQ includes a number of questionnaire items referring to *non-formal* education.

Incidence and number of training activities during last 12 months

Concept definition and operationalization:

Non-formal education is defined as "education that is institutionalised, intentional and planned by an education provider. The defining characteristic of non-formal education is that it is an addition, alternative and/or complement to formal education within the process of lifelong learning of individuals. It is often provided in order to guarantee the right of access to education for all. It caters to people of all ages but does not necessarily apply a continuous pathway structure; it may be short in duration and/or low-intensity; and it is typically provided in the form of short courses, workshops or seminars. Non-formal education mostly leads to qualifications that are not recognised as formal or equivalent to formal qualifications by the relevant national or sub-national education authorities or to no qualifications at all." (Eurostat 2016). The PIAAC Cycle II questionnaire uses "training activities" as the indicator for non-formal education and uses a show card with examples to help respondents understand the scope of the concept. If translated and adapted well to reflect the above definition of non-formal education, this terminology can be understood in the same way by respondents across different countries. PIAAC collects, among others, information on whether the respondent participated in any training during the last 12 months and in how many training activities the respondent participated during the last 12 months.

Concept rationale:

These items provide a snapshot of human capital investments outside of formal education by the incidence and number of training activities during the previous 12-month period. Next to formal education they are key predictors of skills acquisition and subsequent labour market outcomes as well as outcomes of education and skills in their own right.

Question(s):

B2_Q08a,b

Ever participated in any training activity

Concept definition and operationalization:

This question identifies respondents who have never participated in any training activity as well as those who have participated, but not within the last 12 months.

Concept rationale:

This concept allows an examination of whether effects of ever participating in training are different from the effects of recent participation on skills and outcome measures. Also, it allows studying the exclusion from non-formal education in relation to formal education, skills and other individual characteristics. This item enables researchers to identify persons who are completely abstinent from training and thus provides some further information on human capital accumulation over the life cycle.

Question(s):

B2_Q09

Content of training

Concept definition and operationalization:

The content of the last training activity is measured by asking for the main focus of the training activity.

Concept rationale:

This allows an assessment of the focus of the training activity, whether content of training is related to skills and/or outcomes, and if yes, which kinds of content are most strongly related to skills and/or outcome measures. Some types of content can be expected to be related to basic cognitive skills (reading and writing skills; skills involving numbers, calculating skills, maybe also foreign language skills and creative or musical skills), while others will mostly relate to social and emotional skills (e.g. project management or organizational skills; team-working or leadership skills; handling customers, clients, patients or students; communication and presentation skills; sports, creative or musical skills). Yet others will aim at job-specific skills (e.g. computer or software skills; operating machinery or equipment). Some kinds of content may also be neutral in terms of their relationship with skills, such as work safety or first aid. The item thus also permits excluding those kinds of training from analysis that are not expected to be important from a human capital point of view, e.g. training in the area of security (e.g. work safety or first aid).

Question(s):

B2_Q10

Job-relatedness of training

Concept definition and operationalization:

This question assesses whether the last training activity was job-related or not. The definition of job-related is quite broad and does not only refer to a specific job but also includes improving job opportunities in general.

Concept rationale:

The job-relatedness of a training activity can be seen as an indicator of the relevance of the training activity for (job-related) skills. Using this item, researchers can also exclude non-job-related training activities from analysis if needed.

Question(s):

B2_Q11

Motivation for training

Concept definition and operationalization:

Subjective assessment by the respondent of the main reason for participating in this training activity to measure the underlying motivation. This question is only asked if the last training activity was job-related.

Concept rationale:

In assessing the effect of training, it is crucial to understand the reasons for undertaking the training activity, e.g. whether the respondent only participated in training because he/she was obliged to. In that case, effectiveness is expected to be low. It may also be important to distinguish whether the respondent aimed to improve job and career opportunities by participating in the training, or whether it was more focused on improving performance in the current job, potentially in the face of new or changing work tasks. The item also allows identifying a mostly intrinsic motivation, i.e. participating in training mostly out of interest in the topic, as well as whether obtaining a certificate was the main reason, which may be important in certain occupations and industries.

Question(s):

B2_Q12

Characteristics of last training activity

Concept definition and operationalization:

The following characteristics of the last training activity are measured: Mode of administration (face-to-face, distance, or blended learning); schedule (recurring sessions over several weeks or months or an event concentrated on one or several consecutive days). For respondents who were employed during their last training activity, it is also assessed whether the training activity took place in their normal work environment.

Concept rationale:

Training activities have a number of features that may be relevant for antecedents or outcomes of training and that may moderate training accessibility and effectiveness for skill maintenance and development.

Question(s):

B2_Q13a,d

B2_Q16a

Employment status during participation in training

Concept definition and operationalization:

This item asks respondents for a subjective assessment of their employment status while they were participating in the last training activity.

Concept rationale:

Since the employment status may have changed since participating in the last training activity, it is asked here in addition to the more detailed questions in section C referring to the current situation. The item is also needed for selecting only employed and self-employed respondents for the subsequent items.

Question(s):

B2_Q15

Learning about computerized equipment or digitally supported processes in training

Concept definition and operationalization:

This refers to whether people have learned how to use computerized equipment or digitally supported processes in the last training activity, helping them to better carry out their work tasks. 'Computerised equipment' is meant in an encompassing way, it can include PCs, laptops, tablets, hand scanners, etc. The same applies to 'digitally supported processes' (e.g. room reservation done digitally rather than filling in paper forms, but this is just one example). Only respondents employed while participating in a job-related training activity receive this question.

Concept rationale:

The goal of this item is to capture whether, in the context of digitalization, respondents are prepared and trained for ICT changes at their workplace. Even though this may be related to the content of the training activity (see B2_Q10), it is not the same and learning to better perform your job using digital tools can also happen outside of courses specifically dedicated to computer and software skills.

Question(s):

B2_Q16c

Opportunity costs for employer

Concept definition and operationalization:

This question asks whether this training activity took place during paid working hours, meaning that the working hours are used to attend the activity instead of working, and thus measures the opportunity costs for the employer. It also includes the case where a number of working hours are being replaced by the training activity even if the activity itself takes place outside normal working time of the respondent. If the training activity takes place outside paid working hours and the respondent has received payment for the hours or additional leisure hours, the activity should be coded as during paid working hours. The answer should only reflect the participation in the activity itself and not homework or preparation. Again, only respondents employed while participating in a job-related training receive this question.

Concept rationale:

This variable gives an idea of the investment by employers in the training by estimating the opportunity costs. Blundell et al. (1999) found that employer-supported training is related to higher returns than off-the job training.

Question(s):

B2_Q16b

Usefulness of training for job

Concept definition and operationalization:

Subjective assessment by the respondent of the usefulness of following this training for the job or business he/she had at the time to proxy the effectiveness of training. Only respondents employed or self-employed while participating in the training receive this question, no matter whether it was job-related or not.

Concept rationale:

In assessing the effect of training, it is crucial to understand at least the subjective usefulness of the training for work. We can expect that only training activities regarded as useful by the respondent are effective in terms of labour market or skill returns.

Question(s):

B2_Q17

Received a certificate for training

Concept definition and operationalization:

This refers to whether people have received a certificate for participating in this training activity, which is an indicator of the degree of organisation, institutionalisation and formalisation of the training (even though non-formal training by definition does not reach the degree of formality of formal education).

Concept rationale:

Certificates may increase the likelihood that the skills obtained during training can be translated into better labour market outcomes. Certificates can for example be included in job applications.

Question(s):

B2_Q18

Direct costs

Concept definition and operationalization:

This item provides information on who paid directly for this training, especially whether the respondent's employer contributed to the expenses involved in this training activity and if anyone else paid for the training activity. Types of expenses are mentioned for respondents to understand that it is not only about tuition fees, namely expenses for tuition, course materials, travel, accommodation and so forth. Respondents can name all relevant sources that contributed to the payment of training costs.

Concept rationale:

From a policy viewpoint it is important to not only obtain an indication of the volume of investments, but in the case of non-formal education to have information on the financing of such investments. The variable gives an idea of the investment by employers and other parties such as public employment agencies in the training, in addition to the opportunity costs for employers already covered in B2_Q16b.

Question(s):

B2_Q20

Intensity of training

Concept definition and operationalization:

Training intensity refers to the time invested by the respondent in this training activity in hours. The item asks for a rough estimate because a precise response cannot be expected from most respondents.

Concept rationale:

Information on the time spent on training activities is an additional indicator of the investment in non-formal education, i.e. opportunity costs for the individual and, if training takes place during paid working hours (see above), for the employer. This item allows to investigate the relationship between the amount of training and skills. However, given that it only reflects the duration of the *last* training activity, it does not allow any inference on the total training volume. It was regarded as unfeasible however to ask for the total training volume in the last 12 months in the context of PIAAC given the limitations in interview duration.

Question(s):

B2_Q21

Barriers to training

Concept definition and operationalization:

Barriers to training refer to any obstacles that prevented the respondent from participating in training when he or she would have liked to participate. Barriers are measured by asking why the respondent did not participate in an activity he or she wanted to participate in, after a filter question enquiring whether this was actually the case in the past 12 months.

Concept rationale:

Information on barriers to training is important from a policy point of view because only knowing what keeps people from participating in training enables policy makers to design effective strategies for raising training participation. In addition, the question could be used to construct an Instrumental Variable (IV) for the effect of non-formal training on labour market outcomes.

Question(s):

B2_Q22
B2_Q23

Section C: Current status and work history

Current labour force status

Concept definition and operationalization:

According to the International Labour Organisation (ILO), the *economically active population* comprises all persons of either sex who furnish the supply of labour for the production of goods and services during a specified time-reference period. According to the 1993 version of the System of National Accounts, production includes all individual or collective goods or services that are supplied to units other than their producers, or intended to be so supplied, including the production of goods or services used up in the process of producing such goods or services; the production of all goods that are retained by their producers for their own final use; the production of housing services by owner-occupiers and of domestic and personal services produced by employing paid domestic staff. Two useful measures of the economically active population are the *usually active population* measured in relation to a long reference period such as a year, and the *currently active population*, or, equivalently, the *labour force* measured in relation to a short reference period such as one day or one week. In PIAAC the relevant concept is the currently active population or labour force, subdivided as employed or unemployed according to the main activity.

The "employed" comprise all persons above a specific age who during a specified brief period, either one week or one day, were in the following categories:

(a) "paid employment":

(b) "self-employment":

Unemployment is defined as follows in the Resolution concerning statistics of the economically active population, employment, unemployment and underemployment, adopted by the Thirteenth International Conference of Labour Statisticians (Geneva, 1982):

(1) The "unemployed" comprise all persons above a specified age who during the reference period were:

(a) "without work," i.e., were not in paid employment or self-employment, as defined in paragraph 9;

(b) "currently available for work," i.e., were available for paid employment or self-employment during the reference period; and

(c) "seeking work," i.e., had taken specific steps in a specified reference period to seek paid employment or self-employment.

Labour force status as calculated in C2_D05 (derived variable):

1 Employed
2 Unemployed
3 Out of the labour force
4 Not known

Concept rationale:

Labour force status is a key economic outcome variable to be linked with skills. In addition, it is a key reporting category. The information on current labour force status also acts as a filter question, directing those not currently employed past questions pertaining to current employment situation.

Question(s):

C2_Q01 to C2_Q06

Number of months looking for paid work

Concept definition and operationalization:

Number of months that currently not-employed people have been looking for a job.

Concept rationale:

Lengthy unemployment spells indicate weak labour market position and may lead to skill loss.

Question(s):

C2_Q04

Self-declared main status

Concept definition and operationalization:

The self-declared current or normal "main activity status." The target variable captures the person's own perception of their main activity at present. It differs from the ILO concept to the extent that people's own perception of their main status differs from the strict definitions used in the ILO definitions. For instance, many people who would regard themselves as full-time students or homemakers may be classified as ILO-employed if they have a part-time job. Similarly, some people who consider themselves "unemployed" may not meet the strict ILO criteria of taking active steps to find work and being immediately available. The concept used here is broader than the ILO definition in a number of respects. Despite a certain degree of vagueness, the concept is useful and is widely employed in social research. The concept of "current" implies that any definitive changes in the activity situation are taken into account. For instance, if a person has lost a job or has retired recently, or the activity status has changed otherwise in a definitive manner, then the situation as of the time of the interview should be reported. In this sense, "current" overrides any concept of averaging over any specific reference period (based on Eurostat, 2007).

Concept rationale:

The person's main economic situation (self-defined) is a useful variable. It is the only practical definition to use in examining labour transitions, as it could be done in a panel survey or using a similar variable for the situation one year before. In addition, it permits an important classification of the regular nature of the work or the main reason for not working as opposed to the situation in one specific reference week as in the LFS. For those outside the labour force at present, the nature of their present activity has an important bearing on their likely future labour market participation. People who are retired or unable to work because of disability, for instance, are less likely to respond to an increase in demand for labour than are students or those engaged in home duties (based on Eurostat, 2007). In contrast to the ILO definition, which requires a series of items, this variable is typically based on a single item in surveys.

Question(s):

C2_Q07

Out of work in the last 5 years

Concept definition and operationalization:

This item asks whether the respondent has ever been out of work for a continuous period of 3 months or longer in the last 5 years, and if so, what the total amount of time is that the respondent has been out of work in the last 5 years.

Concept rationale:

This question will help to establish the respondent's employment history, and to gather more information on recent spells of unemployment. This will allow for more granular analyses of the antecedents and outcomes of employment trajectories, for example examining whether recent unemployment spells have scarring effects on labour market outcomes such as wages or job tenure.

Question(s):

C2_Q08

Ever employed

Concept definition and operationalization:

This item asks whether the respondent ever had paid work, whether as self-employed or as a salaried worker.

Concept rationale:

This question will help to establish the respondent's employment history.

Question(s):

C2_Q09a

Recent work experience

Concept definition and operationalization:

This item asks whether respondent had paid work in the last 12 months.

Concept rationale:

The concept will be used for the routing.

Question(s):

C2_Q09b

End of last employment

Concept definition and operationalization:

Year or age at the time of the last employment ended.

Concept rationale:

These two items will be used in combination with interview date to derive a variable indicating for how many years nonworking respondents have been out of work.

Question(s):

C2_Q09c

Number of years employed

Concept definition and operationalization:

This item asks about how many years the respondent has been employed in total, excluding time away from work due to e.g. unemployment, childcare or long-term sickness.

Concept rationale:

This question will help to establish the respondent's employment history.

Question(s):

C2_Q10

Currently working, recent work experience, left work more than 12 months ago

Concept definition and operationalization:

This concept includes respondents who currently work, paid or unpaid, respondents whose work ended 12 months or less before the time of the interview, as well as respondents who left their work more than 12 months ago. This is a derived variable which will be calculated based on information from C2_Q01 and C2_Q09.

Concept rationale:

This concept will be used for the routing.

Question(s):

C2_D10

Receipt of benefits

Concept definition and operationalization:

This item asks if in the last 12 months the respondent received unemployment benefits, sickness benefits or retirement benefits.

Concept rationale:

This question will help to establish whether respondents have received benefits, which could be relevant in relation to the respondent's recent employment history, and as a replacement of wages.

Question(s):

C2_Q11

Changes of employer

Concept definition and operationalization:

The number of different employers in the last five years.

Concept rationale:

The number of changes of employer provides an indication of the stability of the recent work career.

Question(s):

C2_Q12

Section D/E: Current work and Last job

Occupation

Concept definition and operationalization:

ISCO-08 standard occupational classification. ISCO-08 (International Standard Classification of Occupations) is published by ILO (Geneva, 2008). The basis for the classification in the ISCO-08 scheme is the nature of the job itself and the level of skill required. A job is defined as the set of tasks and duties to be performed. Skills are the abilities to carry out the tasks and duties of a job. Skills consist of two dimensions: skill level and domain specialisation. The skill level is related to the level of educational attainment. The questions needed for the classification of occupations are the job title associated with the main job and a further description of the tasks and duties (based on Eurostat, 2007).

Concept rationale:

It is generally recognised that the type of work performed can have a great influence on the living conditions of the individual and household. Hence, social stratification research pays attention to the type of job as a central element in studies of inequalities of opportunities and results, and their reproduction over life cycles and generations. Information on characteristics of the job has two uses: in studying deprivation and social exclusion such variables are used as covariates in the models, while in studying the labour market they have the role of dependent variables. Occupation is a major reporting category, and is also used as input into various socioeconomic classification schemes and derived variables such as social class (based on Eurostat, 2007).

Question(s):

D2_Q01/E2_Q01

Economic sector in employment

Concept definition and operationalization:

Economic activity of the local unit where the individual carries out his or her main professional activity. Where the local unit or enterprise has more than one "economic activity," the dominant should be retained. The ideal measure for determining the dominant activity would be the number of employees for the different activities, rather than more economical concepts like added value or turnover. The "local unit" to be considered is the geographical location where the job is mainly carried out or, in the case of itinerant occupations, can be said to be based; normally it consists of a single building, part of a building, or, at the largest, a self-contained group of buildings. The "local unit" is therefore the group of employees of the enterprise who are geographically located at the same site (based on Eurostat, 2007).

Concept rationale:

The activity sector in which people are employed is a key descriptor for labour market analysis (including issues linked to skills, mobility of workers, quality of the job, etc.) and together with the occupation (ISCO) and the type of contract is very useful to describe the socioeconomic status of individuals (based on Eurostat, 2007).

Question(s):

D2_Q02/E2_Q02

Public/private sector/nonprofit organisation

Concept definition and operationalization:

The public sector comprises the general government sector plus all public corporations including the central bank. A nonprofit organisation is a legally constituted organisation whose objective is to support or engage in activities of public or private interest without any external commercial or monetary profit.

Concept rationale:

The type of sector (public or private) in which people are employed is a key descriptor for labour market analysis (including issues linked to skills, mobility of workers, quality of the job, etc.). In combination with occupation in employment, we can identify low-skilled self-employed and high-skilled self-employed.

Question(s):

D2_Q03/E2_Q03

Status in employment

Concept definition and operationalization:

Professional status of employed persons (employees or self-employed). The definition is based on the ILO resolution concerning the International Classification of Status in Employment (15th ICLS, 1993). The two dimensions that are central to the concept of status in employment are economic risk and authority. The basic distinction is that between employees and the self-employed. Employees are all those workers who hold the type of job defined as "paid employment jobs" – "jobs where the incumbents hold explicit (written or oral) or implicit employment contracts that give them a basic remuneration which is not directly dependent upon the revenue of the unit for which they work (this unit can be a corporation, a nonprofit institution, a government unit or a household). Some or all of the tools, capital equipment, information systems and/or premises used by the incumbents may be owned by others, and the incumbents may work under direct supervision of, or according to strict guidelines set by the owner(s) or persons in the owners' employment. (Persons in "paid employment jobs" are typically remunerated by wages and salaries, but may be paid by commission from sales, piece-rates, bonuses or in-kind payments such as food, housing or training.) Self-employment jobs are those jobs where the remuneration is directly dependent upon the profits (or the potential for profits) derived from the goods and services produced (where own consumption is considered to be part of profits). The self-employed make the operational decisions affecting the enterprise, or delegate such decisions while retaining responsibility for the welfare of the enterprise. (In this context, "enterprise" includes one-person operations.) (based on Eurostat, 2007).

Concept rationale:

Status in employment is associated with life chances in a number of important ways. People who are self-employed benefit directly from the level of profit made by the business or enterprise. On the other hand, they are generally more exposed than employees to economic risk, in that their remuneration is tied more directly to the level of profit (based on Eurostat, 2007).

Question(s):

D2_Q04/E2_Q04

Tenure

Concept definition and operationalization:

Years respondent has been working for the current employer or has been self-employed.

Concept rationale:

Tenure is expected to affect skill acquisition at work.

Question(s):

D2_Q05/E2_Q05

Changes in role

Concept definition and operationalization:

Changes in job level, department/unit, or nature of tasks and responsibilities since the respondent started working for their current employer.

Concept rationale:

Changes in job roles (such as promotions, or changes in the nature of tasks) are expected to be related to skills and to economic and non-economic outcomes.

Question(s):

D2_Q06

Organisation size

Concept definition and operationalization:

Organisation size in terms of employed people at the local workplace. The "local unit" to be considered is the geographical location where the job is mainly carried out or, in the case of itinerant occupations, can be said to be based; normally it consists of part of a building, a single building, or, at most a self-contained group of buildings. The "local unit" is therefore the group of employees of the enterprise who are geographically located at the same site (based on Eurostat, 2007).

Concept rationale:

Organisation size is an important reporting category. In addition, analysis of labour market data shows that the size of the organisation impacts on the availability of training for employees as well as on earnings.

Question(s):

D2_Q07a/E2_Q06

Change in organisation size
Concept definition and operationalization:
Change in organisation size over the past 12 months.
Concept rationale:
Changes in total organisation size may affect changes in employment and training opportunities.
Question(s):
D2_Q07b

Other locations of organisation
Concept definition and operationalization:
This item asks whether the local workplace is part of a larger organisation.
Concept rationale:
It is the total size of the organisation rather than the local size of the establishment that affects the respondent's training and employment opportunities. However as respondents find it difficult to report on the total size, we only ask this question.
Question(s):
D2_Q07c

Number of employees
Concept definition and operationalization:
Number of employees working for the self-employed respondent.
Concept rationale:
Number of employees is important for coding the occupation and deriving the social status.
Question(s):
D2_Q08/E2_Q07

Supervisory status
Concept definition and operationalization:
Number of people the respondent supervises or manages, directly or indirectly. This question is only asked to employees. An example: A CEO of a firm may supervise three managers directly. If each of them supervises 10 people, the CEO will supervise three people directly plus 30 people indirectly. In this case, the correct answer would be 33 people (25 or more).
Concept rationale:
Control variable for estimating the effects of education and skills on outcomes.
Question(s):
D2_Q09

Employment contract
Concept definition and operationalization:
Employees may have different types of contract (including no contract). The main distinction is between contracts with unlimited and limited duration. The latter refer to employees whose main job will terminate either after a period fixed in advance, or after a period not known in advance, but nevertheless defined by objective criteria, such as the completion of an assignment or the period of absence of an employee temporarily replaced (based on Eurostat, 2007). We also distinguish zero hour contracts, freelance contracts, and apprenticeships.
Concept rationale:
The type of contract directly affects the job security of the employee and is thus a relevant economic outcome.
Question(s):
D2_Q10/E2_Q08

Working hours
Concept definition and operationalization:
This item provides information on usually worked hours including paid or unpaid overtime.
Concept rationale:
Economic and social outcome.
Question(s):
D2_Q11/E2_Q09

Education-job match
Concept definition and operationalization:
In combination with the types of education completed it will be possible to derive the formal and the substantive education-job match (whether one needs his or her own level of education to get the job vs. whether one needs his or her own level of education to do the job), distinguishing overeducation, adequate education and undereducation.
Concept rationale:
Education-job match is considered both an important predictor of skills (overeducated people have less opportunity to develop their skills) as well as an important outcome variable (indicator of labour market success).
Question(s):
D2_Q12a-c/E2_10a-c

Required work experience
Concept definition and operationalization:
Work experience required to get the respondent's job.
Concept rationale:
Work experience is a good indicator for the specific skills that are required at work.
Question(s):
D2_Q12d/E2_10d

Job satisfaction
Concept definition and operationalization:
Subjective overall appraisal of the job.
Concept rationale:
Job satisfaction is an important outcome, picking up different elements of the job (e.g., earnings, working hours, etc).
Question(s):
D2_Q13

Earnings
Concept definition and operationalization:
This set of questions aims to provide information on the respondent's gross pay and gross annual bonuses. Gross pay is defined as pay before deductions for tax, national insurance (social security contributions), including any regular overtime pay, regular bonuses, tips, and commissions, excluding annual bonuses.
Concept rationale:
Earnings are considered to be the most important outcome variable, affected by skills and education/training. In combination with working hours, the hourly wage can be calculated. More generally, the aim of this core variable is to obtain a proxy of the economic well-being of the respondent.
Question(s):
D2_Q14 to D2_Q16

Reason for leaving job

Concept definition and operationalization:

The main reason given by those not currently employed for leaving the last job they held, including a distinction between voluntary and involuntary job loss.

Concept rationale:

Information on the circumstances under which respondents not currently working left their last employment is relevant from a policy point of view.

Question(s):

E2_Q11

Section F/G: Literacy, numeracy and ICT practices at work and in everyday life

Reading skill use
Concept definition and operationalization:
This set of questions aims to provide measures of reading skill use in the current job/last job and everyday life (including studies).
Concept rationale:
The uses of skills in the domains of the DA are important as drivers of skills acquisition and as important outcome variable in themselves. They are considered to be the complement of what is being measured in the DA.
Question(s):
F2_Q01/G2_Q01

Writing skill use
Concept definition and operationalization:
This set of questions aims to provide measures of writing skill use in the current job/last job and everyday life (including studies).
Concept rationale:
The use of skills in the domains of the DA is important as drivers of skills acquisition and as important outcome variables in themselves. They are considered to be the complement of what is being measured in the DA.
Question(s):
F2_Q02/G2_Q02

Numeracy skill use
Concept definition and operationalization:
This set of questions aims to provide measures of numeracy skill use in the current job/last job and everyday life (including studies).
Concept rationale:
The use of skills in the domains of the DA is important as drivers of skills acquisition and as important outcome variables in themselves. They are considered to be the complement of what is being measured in the DA.
Question(s):
F2_Q03/G2_Q03

Access to ICT
Concept definition and operationalization:
These ask whether the respondent has ever used a smartphone, tablet, laptop or desktop computer, and if so, how often respondents use these devices.
Concept rationale:
Having access to ICT is a prerequisite for developing ICT skills. These questions will be used as a filter question.
Question(s):
F2_Q04/G2_Q04, G2_Q05

ICT skill use
Concept definition and operationalization:
This set of questions aims to provide measures of ICT skill use in the current job/last job and everyday life (including studies).
Concept rationale:
The usage of ICT in people's work and everyday life has increased dramatically across all OECD economies. Patterns of use also went through remarkable changes, driven by important technological and market developments. The use of ICT skills is important as drivers of skills acquisition and as important outcome variables in themselves.
Question(s):
F2_Q05/G2_Q06

Section H: Working environment

Skills used at work

Concept definition and operationalization:

Respondents will be asked questions about the skills that they use at work, other than the literacy, numeracy and ICT skills already covered in Section F, and captures these through items describing the generic activities involved in doing the job. The items relate to the following conceptual domains: cooperation (H2_Q01), horizontal interaction (H2_Q03a-c) and client interaction (H2_Q03d), self-direction (H2_Q04a-b), influence (H2_Q05a-b), problem-solving (H2_Q06a-b), and physical skills (stamina (H2_Q07a) and manual skill (H2_Q07b)). Also, to capture the role of job automation in the skills used at work, one item measures to what extent people's jobs involve short repetitive tasks (H2_Q17).

Concept rationale:

The choice of items is informed by theories of skill and the practices of commercial occupational psychology. Sociological theory makes a distinction between "own skills" (the skills that individuals have) and "job skills" (the skills defined by jobs), and it was decided to measure some important job skills directly. The direct assessments in PIAAC are limited to relatively few, albeit crucial, skill domains. Yet other skills have become increasingly relevant in modern workplaces. Important examples are communication skills and the skills needed to work at multiple and flexible tasks, and to work more independently. There was also evidence that some of these skills were, like computing skills, being rewarded in the labour market over and above the returns to the education that people had received.

Question(s):

H2_Q01, H2_Q03-H2_Q07, H2_Q17

Work autonomy

Concept definition and operationalization:

Work autonomy with regard to the sequence of tasks, methods of work, speed or rate of work, and working hours.

Concept rationale:

Work autonomy is an important prerequisite for informal learning and thus one of the drivers of skills acquisition.

Question(s):

H2_Q08

Learning environment

Concept definition and operationalization:

These items aim to provide measures for the quality of the learning environment in the workplace.

Concept rationale:

The workplace environment has a large effect on providing informal learning opportunities. These in turn are expected to be an important driver of skills acquisition

Question(s):

H2_Q09

High performance work practices

Concept definition and operationalization:

High performance work practices (HPWPs) are related to the measures of skills used at work, but focus on practices in the working environment. The items relate to the following conceptual domains: organisation type (H2_Q11a-h, H2_Q12), teamwork (H2_Q02a-e), social support and knowledge sharing (H2_Q10, H2_Q13a-c), participation (H2_Q14a-b), and well-defined objectives, continuous feedback, and reward to good performance (H2_Q15, H2_Q16a-c)).

Concept rationale:

The working group on 'Skills use and mismatch' argues that these practices can increase firms' internal flexibility to adapt job tasks to the skills of new hires, while also promoting a better allocation of the workforce to the required tasks, suggesting one potential channel related to skills use and skills mismatch. Also, some HPWPs may encourage the deployment of skills at work by increasing motivation among workers. To strengthen these initial findings, better information is needed on the characteristics of the work environment which would help shed light on the potential mechanisms and on the practices that are particularly effective.

Question(s):

H2_Q02, H2_Q10-H2_Q16

Changes in the workplace

Concept definition and operationalization:

This item allows respondent to indicate if significant changes to any of the following have occurred in their working environment: machinery; information and communication technologies; working methods and practices; outsourcing and relocation practices; c products or services; and the amount of contact you have with clients or customers. We also include an item measuring whether any of these changes were supported by training activities paid for by employers.

Concept rationale:

Measuring changes in the workplace allows for an examination of how mega trends, such as technological progress, have affected the workplace.

Question(s):

H2_18a,b

Skills mismatch

Concept definition and operationalization:

Skills mismatch refers to a job situation where the job holder has the skills to cope with more demanding duties than the skills that are required to perform well in that job. By "more demanding duties," we mean tasks and responsibilities that would require more knowledge and skills than are required to carry out the tasks and responsibilities that are typical of the respondent's current job.

Concept rationale:

Skills mismatch is an important outcome variable. In combination with the nominal education-job mismatch (see before), it is important to analyse to what extent educational mismatches are related to skill mismatches. This can also be related to the actual skills levels as measured in the DA. Skills mismatch is covered by three items: one item captures whether respondents experience skills mismatch in their job (H2_Q19a), one item covers which specific skills they thought of when they reported on their skills mismatch (H2_Q19b), and one item measures whether respondents experienced skills mismatch when they started their job with their current employer (H2_Q20).

Question(s):

H2_Q19, H2_Q20

Section I: Non-economic outcomes

Political efficacy
Concept definition and operationalization:
Political efficacy is the extent to which people feel they understand and can affect politics. The item measures internal political efficacy.
Concept rationale:
Political efficacy is an important social outcome. Political efficacy is associated with educational attainment across a broad range of settings.
Question(s):
I2_Q01a

Social trust
Concept definition and operationalization:
These items aim to provide measures of social trust. Giddens (1990) defines trust as "confidence in the reliability of a person or system."
Concept rationale:
Social trust is an important social outcome. Many scholars have pointed out that trust is essential to the stable functioning of the economy and of society in general. Few transactions if any can take place solely on the basis of self-interest on the part of the transacting parties.
Question(s):
I2_Q01b

Voluntary work
Concept definition and operationalization:
Voluntary work involves doing work without pay for charities, political parties, trade unions or other nonprofit organisations.
Concept rationale:
Voluntary work is considered to be an important indicator of social engagement, but can also be seen as an opportunity for informal learning.
Question(s):
I2_Q02

General health
Concept definition and operationalization:
Subjective measure of respondent's general health.
Concept rationale:
This concept is widely used in international surveys and provides an important social outcome for PIAAC.
Question(s):
I2_Q03

Patience
Concept definition and operationalization:
Patience refers to the willingness to give up something that is beneficial today in order to benefit more from that in the future.
Concept rationale:
Patience is likely to influence investment in and returns to skills.
Question(s):
I2_Q04

Life satisfaction

Concept definition and operationalization:

This item captures to what extent, all things considered, people are satisfied with their life as a whole.

Concept rationale:

Life satisfaction is a widely used indicator of general well-being. The importance of well-being for people's daily functioning and as an important macro outcome has become increasingly recognized.

Question(s):

I2_Q05

Section J: Background

Household composition

Concept definition and operationalization:

The place of usual residence is recommended for use as the basis of the household membership. The existence of shared expenses in the household (including benefiting from expenses as well as contributing to expenses) shall be used to determine who is regarded as household members. The following persons, if they share in household expenses (including benefiting from expenses as well as contributing to expenses) shall be regarded as household members:

1. Persons usually resident and related to other household members;
2. Persons usually resident, not related to other household members;
3. Resident boarders, lodgers, tenants, etc., with no private address elsewhere, actual/intended stay one year or more;
4. Visitors, with no private address elsewhere, actual/intended stay one year or more; 5. live-in domestic servants, au-pairs, etc., with no private address elsewhere, actual/intended stay one year or more;
5. Persons usually resident but temporarily absent (for reasons of holiday travel, work, education or similar), with no private address elsewhere and actual/intended absence less than one year;
6. Children of household members being educated away from home, with no private address elsewhere, continuing to retain close ties with the household;
7. Persons absent for long periods but having household ties (e.g. persons working away from home), child or partner of other household member, with no private address elsewhere, continuing to retain close ties with the household;
8. Persons temporarily absent but having household ties (e.g., persons in hospital, nursing homes or other institutions), with clear financial ties to the household, actual/prospective absence less than one year.

A person shall be considered “usually resident” if they spend most of their daily rest there evaluated over the past one year. Persons forming new households or joining existing households shall normally be considered as members at their new location if there is an intention to stay for more than one year. Similarly, those leaving to live elsewhere shall no longer be considered as members of their original household (based on Eurostat, 2007).

Concept rationale:

Household type is also extremely useful in providing information on dynamics of household structure, and to calculate equivalized income measures (based on Eurostat 2007).

Question(s):

J2_Q01
J2_Q02a

Partner's main status

Concept definition and operationalization:

The current or normal "main activity status" of the partner or spouse. See also C2_Q07.

Concept rationale:

Research has clearly pointed out that an individual’s occupational outcomes are closely related to the labour force status of the partner.

Question(s):

J2_Q02b

Children

Concept definition and operationalization:

Number and ages of respondent’s children, if there are any.

Concept rationale:

Having children can affect careers, leading to delays, interruptions, non-participation in training etc., particularly for women.

Question(s):

J2_Q03

Mother and father present

Concept definition and operationalization:

These items distinguish whether there was a mother and a father present during childhood.

Concept rationale:

Single parenthood is associated with economic strain and other disadvantages negatively affecting children's life chances, including educational opportunities. Additionally, without this concept, respondents who did not have a mother present in their childhood (for example because she died) were confronted with this absence in multiple questions. To avoid this, the questions on the presence of parents in the childhood were included. In case there was no mother and/or father present, respondents are routed to the questions that follow after the questions about the parents.

Question(s):

J2_Q04a, J2_Q05a

Mother's and father's education

Concept definition and operationalization:

Highest level of education the respondent's mother and father have ever completed, coded into primary or lower secondary education, upper secondary or post-secondary education, and tertiary education.

Concept rationale:

Research has clearly pointed out that an individual's educational attainment is influenced by the educational attainment of his or her parents. While also taken as a general indicator of social status, parental education specifically reflects the cultural resources in the family of origin.

Question(s):

J2_Q04c, J2_Q05c

Mother's and father's occupation

Concept definition and operationalization:

The questions used to classify occupation are the job title associated with the main job and a further description of the tasks and duties (see also D2_Q01 for further details on how occupations are classified).

Concept rationale:

Research has clearly pointed out that an individual's educational attainment and labour market outcomes are influenced by the occupation of his or her parents, over and above the influence of parental education. It is thus likely that general basic skills are also affected by this social background variable. In contrast to parental education, parental occupation reflects the economic resources of the family of origin because occupations are a good proxy measure for lifetime income. Measuring parental occupation in PIAAC allows studying social inequalities in education *and* skills across countries, which is an important indicator of societal equity and mobility. These are believed to be closely related to the efficient use of human capital in economies as well. Given the clear causal ordering, effects of parental occupation can be interpreted in a causal fashion (even if the underlying mechanisms are still a matter of interpretation).

Question(s):

J2_Q04d-f, J2_Q05d-f

Parents' cultural capital

Concept definition and operationalization:

Cultural capital is defined by Bourdieu as the symbols, ideas, tastes, and preferences that can be used as resources in social action. Thus middle-class parents are able to endow their children with the linguistic and cultural competences that will give them a greater likelihood of success at school and at university. Working-class children, without access to such cultural resources, are less likely to be successful in the educational system. Cultural capital is indicated by the number of books in the household. This is widely used measure of cultural capital used in international surveys (e.g., PISA).

Concept rationale:

This item provides an indication of the foundation for skill acquisition that has been provided in the home. The relationships between cultural capital of the parents and skill acquisition as well as economic outcomes have been established in the literature.

Question(s):

J2_Q06

Place of residence while growing up

Concept definition and operationalization:

The level of urbanization of the place where respondents lived during their childhood.

Concept rationale:

To obtain unbiased estimates of skills on potential outcomes it is important to identify exogenous sources of variation that might affect the level of schooling. Geographical location when growing up is an example of a variable that has been identified in the literature that induces exogenous variation in the resources that are available.

Question(s):

J2_Q07

Household composition while growing up

Concept definition and operationalization:

The people respondents lived with during childhood is used as the basis for determining the household composition while growing up. Respondents are asked to mark all that apply from the following

1. Biological mother
2. Biological father
3. Adoptive, step or foster mother
4. Adoptive, step or foster father
5. Brother(s) or sister(s)
6. Grandparent(s)
7. Other relative(s)
8. Other non-relative(s)

If the respondent had more than one main residence at age 14 (e.g., divorced parents), she/he should report on people living in all these residences. Additionally, respondents are asked how many siblings they had at that time, and whether they were the oldest or the youngest sibling.

Concept rationale:

To obtain unbiased estimates of skills on potential outcomes it is important to identify exogenous sources of variation that might affect the level of schooling. Household composition, siblings, and birth order are examples of family characteristics have been identified in the literature that induce exogenous variation in the resources that are available.

Question(s):

J2_Q08

J2_Q09a,b,c

Section K: Social and emotional skills

Concept definition and operationalization:
Five key social and emotional (i.e., "non-cognitive") skills that relate to economic and non-economic outcomes: Conscientiousness, Emotional Stability, Extraversion, Agreeableness and Openness to Experience. The Big Five are a factor-analytically derived model. Its five dimensions describes human personality in a comprehensive yet parsimonious fashion. Extraversion describes characteristics such as being outgoing, sociable and assertive. Agreeableness denotes the ability to be compassionate and respectful and to cooperate with others. Conscientiousness characterises the tendency to be organized, responsible and productive. Emotional stability refers to the disposition to remain calm, anxiety-free and in a generally good mood. Openness to Experience describes characteristics such as curiosity, aesthetic sensitivity and creativity.
Concept rationale:
The inclusion of this module will help in identifying how cognitive skills (i.e., literacy and numeracy) interact with social and emotional skills to produce economic and non-economic outcomes, how they cross-fertilize or compensate for each other. Although Conscientiousness and Openness to Experience have emerged as most predictive for life outcomes, there is evidence showing also the other three dimensions are relevant to a broad range of economic and non-economic outcomes. Moreover, all five dimensions show robust links to fluid and crystallized cognitive abilities, including literacy and numeracy. The module will also allow to shed light on cross-national and sociodemographic (subgroup) variation in the returns to social and emotional skills. Moreover, it will enhance our understanding of how formal and non-formal education contribute to the formation and maintenance of the most critical social and emotional skills.
Question(s):
K2_Q01a-K2_Q06e

Appendix 2: The Doorstep Interview

For PIAAC Cycle 2 a very short doorstep interview has been developed, for administration to respondents who are insufficiently proficient in the official language(s) in which the BQ is administered in their country. The doorstep interview is a short alternative to the BQ designed to obtain key information on characteristics of respondents who would have been handled as literacy- related non- respondents in PIAAC Cycle 1. These individuals are essential to the population model for the estimation of proficiencies and some information related to their background characteristics will help improve the population model and contribute to the analysis and reporting of key findings.

The occurrence of literacy- related non- response is obviously not random, but is thought to be largely concentrated among migrants with low literacy in the official survey languages within a country, and perhaps with low literacy in general. However, the extent of this concentration is currently unknown due to the lack of further information on these groups. By providing a short/succinct version of the BQ translated into a range of languages, we expect that more can be learned about this population.

The doorstep interview will be introduced as a short at- the- doorstep instrument (between two and four minutes) with a decision rule to direct the respondents concerned to the doorstep interview in the appropriate language. The doorstep interview is to be self- administered as it will most probably be in a language the interviewer cannot speak. The consequence is that if a respondent cannot read, he or she cannot complete the doorstep interview. For up to eight prioritised languages not covered by existing national questionnaires, the international master core BQ will be centrally translated.

In order to be implemented successfully, and not impose any unnecessary burden on participating countries, interviewers, and the respondents themselves, simplicity is an essential feature in its design. Therefore, the doorstep interview does not include any national extensions or (structural) adaptations.

The doorstep interview contains the following questions:

- Are you male or female?
- How old are you?
- How many years of schooling have you completed?
- What is your current status?
- In which country were you born?
- How long have you been living in the survey country?

Appendix 3: Detailed overview of changes to the BQ compared to PIAAC Cycle 1

Introduction

To ensure that those who are already familiar with PIAAC from Cycle 1 have a good overview of what has remained the same and what has changed, this Appendix contains a detailed outline of the changes made between Cycle 1 and Cycle 2.

After PIAAC Cycle 1 it was decided that, after a critical evaluation and revision, a substantial share of the items from Cycle 1 should be used in Cycle 2 without significant modification. These items proved to be of significant value and experts and users identified no specific reason to change them. Using identical items in Cycles 1 and 2 offers the advantage of enabling trend analyses between Cycle 1 and Cycle 2, e.g. to monitor and examine changes in skills over time and their impact on labour market outcomes. Moreover, because these items have already been translated and adapted this entails significant cost-savings for countries that participated in Cycle 1.

However, to meet the aims of PIAAC Cycle 2, a number of improvements and innovations were also suggested for the BQ, most notably:

a. revision of the measurement of education and training;
b. inclusion of better measures of the living situation during childhood
c. revision of the JRA items used in PIAAC Cycle 1 to include items that shed light on topical issues such as job automation;
d. inclusion of measures of social and emotional skills;
e. broadening the range of non-economic outcomes captured;
f. improvement in the balance between the number of questions for working and non-working respondents by increasing the number of items aimed at inactive and unemployed respondents; and
g. inclusion of a new short doorstep interview for respondents who are not able to complete the main BQ (e.g. due to language barriers or low literacy).

As such, the BQ development for PIAAC Cycle 2 aims to strike a balance between continuity (through the use of trend items) and innovation (through the development of new items), partly to capture new concepts, and partly to improve the measurement of existing concepts. In order

to get an overview of these improvements, this document gives a short rationale for revising or adding new items to the background questionnaire (BQ) of PIAAC Cycle 2. Each module is discussed item by item. In the Annex a list of dropped items is provided.

The outline of this document is as follows. First, we present a brief description of the module and changes to the module compared to Cycle 1, after that a list of so-called strict trend items, then a list of soft trend items, and finally a list of new items. Strict trend items are items that are exactly the same as in Cycle 1, apart from their placement in the questionnaire. Soft trend items measure the same concept as in the first cycle, but are not exactly the same as in Cycle 1. This includes (minor) changes such as an additional category, other wording or rephrasing. The rationale behind the new items is discussed in more detail. Finally, at the end of the document a list of dropped items is provided.

Module A – Personality characteristics

Modules A gives key descriptive indicators of the background and personal situation of respondents. Most of the content of this module was taken from modules A and J in Cycle 1. The original Module A comprised only year and month of birth and sex . These items have been retained in more or less their original form in Cycle 2 module A, and these have been supplemented by several other background questions (country of birth, migration timing, country of birth of the parents, and languages used in the childhood home and in the current household) that were moved forward to this module from their original position in Module J of Cycle 1. The rationale for moving these additional items to the start of the BQ was that it seemed good to have a somewhat more extensive set of questions about the respondent as a way of allowing the respondent to introduce him/herself before asking detailed questions about the educational career.

It was decided to restrict the questions asked in Module A to relatively basic aspects of the personal situation, and to defer more extended questions, such as those pertaining to the respondent's spouse, children and the situation in the childhood home, to Module J near the end of the BQ, which is similar to Module J in Cycle 1.

List of strict trend items in Module A

Cycle 1	**Cycle 2**	**Indicator**
A_D01a1	A2_D01a1	Month of the interview
A_D01a2	A2_D01a2	Year, one year before interview
A_D01a3	A2_D01a3	Year of interview
A_D01a4	A2_D01a4	Month and year combination
A_Q01a	A2_Q01a	Birth year
A_Q01b	A2_Q01b	Birth month
A_N01	A2_N02	Sex
J_Q04a J_Q04b J_S04b	A2_Q03a A2_Q03b A2_S03b	Country of birth
J_Q04c1 J_Q04c2	A2_Q03c1 A2_Q03c2	Age at time of immigration Year at time of immigration

J_Q05a1 J_S05b	A2_Q04a1 A2_S04a1	First language learned at home in childhood
J_N05a2	A2_N04a2	More than one language at home in childhood
J_Q05a2 J_S05a2	A2_Q04a2 A2_S04a2	Second language learned at home in childhood
J_Q05b J_S05b	A2_Q04b A2_S04b	Language most commonly spoken at home currently

List of soft trend items in Module A

Cycle 1	**Cycle 2**	**Indicator**	**Rationale**
J_Q06a	A2_Q03d	Mother's country of birth	'Female guardian' was dropped so that question on country of birth refers to the biological mother.
J_Q07a	A2_Q03e	Father's country of birth	'Male guardian' was dropped so that question on country of birth refers to the biological mother.

Module B – Education and training

For the most part, Module B covers the same broad concepts as were covered by the comparable module in the PIAAC Cycle 1 BQ, namely formal and non-formal education. As in the Classification of Learning Activities (Eurostat 2016), education in both cases includes training.

However, the previous PIAAC Cycle 1 questionnaire is improved for Cycle 2 in the following ways:

- PIAAC Cycle 1 made use of the old version of ISCED (ISCED 1997) as the new one was not implemented yet at the time the national versions of the BQ were developed. For PIAAC Cycle 2 we use a coding scheme based on ISCED 2011, distinguishing a maximum of 29 different categories: this allows a good differentiation between different levels and types of education such as orientations (i.e. general versus vocational) of qualifications or whether they provide access to a higher level of education or not.
- In Cycle 1 the development of instruments and the mapping of national qualifications to the international standard was largely left up to national experts. This led to some measurement and coding inconsistencies across countries. To avoid such problems in Cycle 2, we have implemented a bilateral consultation process, whereby consortium experts and national experts consult on and approve the appropriate national categories and mapping to the international standard in addition to the formal adaptation phase for other parts of the BQ. However, many of the inconsistencies across countries are rooted in an inconsistent application of ISCED across countries. Since PIAAC will implement the official ISCED mappings, the degree to which cross-country inconsistencies can be 'repaired' in the consultation process is limited.
- In Cycle 1 it was not always clear whether or not the highest qualification was obtained abroad. This has now been corrected by adding a separate question asking whether the qualification was obtained abroad.
- PIAAC Cycle 1 provided no information on education completed in addition to the highest qualification. Such information can have a predictive value in terms of outcomes that is independent and/or supplementary to that of the highest qualification, and can play an important role in policy analyses on alternative pathways through education. We have now added a checkbox item asking respondents to report which other qualifications they have completed.

- The PIAAC Cycle 1 response categories in the questions on field of study were sometimes rather broad and undifferentiated. For PIAAC Cycle 2 we used ISCED-F 2013 as the basis for a more detailed and differentiated list of categories.
- The Cycle 1 BQ did not provide definitive information on the time at which the respondent left the formal education system.
- Several changes concerning non-formal education were necessary because concerns have been identified with respect to the quality of the data on the incidence of participation in non-formal education in Cycle 1. Whereas in PIAAC Cycle 1, respondents reported more than 15 activities, on average, this figure was much lower in other surveys, for example, in the Adult Education Survey 2012, where respondents reported around five activities (see Allen, Massing, Schneider & Van der Velden 2017).
- For Cycle 2, we also propose a more efficient way to collect information on non-formal education. Compared to Cycle 1, the total number of items per person is reduced while still getting the same kind of information yet with less measurement error. Some kinds of information were however also deemed less relevant by the BQEG and thus dropped.
- In Cycle 1, the questions on non-formal education referred to the terminology "organized learning activities", which was hard to grasp for respondents. For Cycle 2, the source questionnaire consistently uses the term "training activities" as the empirical indicator for non-formal education throughout the module in order to (1) simplify the wording of the questions, (2) be closer to natural everyday language, and (3) be more easily understood by different groups of respondents compared to the rather technical and more awkward terminology "organized learning activities".[3]

Below we elaborate a bit more on each of these changes.

Coding scheme for formal education

One of the key innovations of the PIAAC Cycle 2 BQ is an improved international education coding scheme, based on ISCED 2011, to measure formal education. This will be implemented for the items on qualification currently pursued, highest completed qualification, other completed qualifications, education started but not completed and required qualification to get and do the job (in Sections D and E). The improvements have three aims: (1) more relevant

[3] Countries will be instructed to choose a terminology that reflects the concept of non-formal education in their language/culture most adequately for their national versions.

information on formal education (such as a clear differentiation between vocational and general qualifications), (2) a higher level of cross-national comparability (due to a more centralized consultation to establish measurement instruments and consistently apply ISCED mappings to the national education categories) and (3) more flexibility as regards the production of derived variables and coding of formal education for data analyses.

In order to achieve this, the first step was to revise the target international education coding scheme. For PIAAC Cycle 2, we use a coding scheme that is based on, but also augments, ISCED 2011 (UNESCO Institute for Statistics 2012). This revised coding scheme is more detailed and specific than that used in Cycle 1, but can be mapped to the coding schemes used in both PIAAC Cycle 1 and previous large-scale assessments of adults (ALL). Although this coding scheme is much more differentiated than in Cycle 1, in practice the number of categories will still be lower than the maximum of 29 in any given country.

Education consultation process

The second step towards improving the measurement of formal education is to enhance the process of developing country-specific education measures and mapping them to the international education coding scheme. Countries receive more in-depth guidance on how to fulfil the PIAAC education coding requirements (see the "PIAAC Cycle 2: Background Questionnaire Harmonization and Extension Guidelines" on the PIAAC portal), and a centralized consultation process ensures that the requirements are followed in a consistent manner across countries.

Qualifications obtained abroad

The Cycle 1 BQ included "Foreign qualification" as a final response option in the question on highest completed education, and respondents who chose this answer were asked in which country they completed this education before being asked to estimate the level in the target country's educational classification that best corresponded to the highest qualification they attained in their home country. A problem with this approach is that many foreign-born respondents reported their attainment level directly in the initial question. As a consequence, the resulting information seriously underestimates the proportion of qualifications that were obtained abroad. In the Cycle 2 BQ, we ask a separate question on whether the respondent completed their highest qualification abroad, and if so in which country it was obtained. Respondents with foreign qualifications report these in the same item as other respondents, thus

being asked to select the host country educational qualification that corresponds most closely to their foreign qualification.

Educational pathways

PIAAC Cycle 1 did not collect any information on educational pathways beyond highest qualification obtained and (highest) qualification not completed. For PIAAC Cycle 2, a need for more detailed data on educational pathways was repeatedly expressed. Due to time and space considerations, it is however not feasible to record detailed educational histories of respondents in PIAAC Cycle 2 either. As a compromise, we added a checkbox item to ask respondents about other qualifications obtained. We also added questions on when respondents obtained their highest qualification and if and when they left education without finishing, which allows some insight into whether some of the respondent's education was followed as a mature aged adult, as opposed to following the "regular" pathway through education in childhood and early adulthood. From an analytic point of view this is already a big step forward, since it captures most of the diversity that exists within and between countries in the routes people can follow through education.

Field of study

In PIAAC Cycle 1, field of study was measured at the 1 digit level, based on the ISCED 97 broad fields of education and training. This scheme was rather broad and undifferentiated, with for example no distinction between social sciences, economics, business and law (a large group in most countries). This left two broad options, the first being simply to use the existing coding scheme as used in Cycle 1, and the second option to use a more detailed existing coding scheme, specifically ISCED-F 2013 2-digit Fields of Education and Training.

Although the latter option had the advantage of greater detail, it had not been tested in a cross-national survey setting, so it was not clear how well this would work. The Fields of Education and Training classification is first and foremost an administrative coding scheme that does not necessarily correspond strongly with actual naming protocols used by educational institutions and respondents. Respondents who are not able to identify their own field of study quickly might have found this longer list confusing or burdensome, and this could have negatively affected the quality of responses and the questionnaire flow. In sum, although the latter option represented a potential analytical improvement over the old coding scheme, there was insufficient time to properly test how it would work before the field phase began.

For this reason, a compromise was developed, based on ISCED-F 2013. We used the following principles when designing this new PIAAC Cycle 2 classification for Fields of Study:

- Although ISCED-F 2013 generally serves as a good starting point for classifying fields of study, the placement of certain programs is debatable according to the experts and also causes confusion among respondents. E.g. the detailed field of 'Economics' is considered to be more close to the narrow field of 'Business and Administration' than to the Broad Field of 'Social Sciences, Journalism and Information' to which it belongs according to ISCED-F 2013. We decided that the classification does not necessarily need to be mapped back into ISCED-F 2013 Broad fields. Although mapping to ISCED-F 2013 is still to a large extent possible, the mapping is not exact.
- Some broad fields in ISCED-F 2013 are considered too broad and are split up.
- Respondents who followed general programs at ISCED level 2 and 3 will skip the questions on major area or field of study: the pretest clearly shows that it is confusing for respondents to indicate a field if they cannot have had one yet. In PIAAC Cycle 1 this was not possible yet, but the current classification of national qualifications allows us to distinguish vocational from general programs at these levels.
- Some respondents who completed vocational training also indicate that they followed a general programme, although this is probably a mistake. This might be caused by the fact that this category was the first on the list. To prevent vocationally educated to make such a mistake, we re-ordered the list and moved this category to the bottom of the list. We also renamed this to: 'No main area of study or emphasis, it was a general education programme'.
- We also re-ordered the list such that more prominent fields of study appear at the top and the least prominent at the bottom, while still preserving some logic (related fields of study are placed close to each other).

The following narrow fields have been moved to other broad fields than in ISCED-F 2013:

- Detailed field 'Economics' is grouped with Narrow field 'Business and Administration', instead of Narrow field 'Social and Behavioural Sciences'.
- Narrow field 'Environment' is grouped with Narrow fields 'Agriculture', 'Forestry', and 'Fisheries', instead of Broad field 'Natural Sciences, Mathematics and Statistics'

- Detailed field 'Veterinary' is grouped with Narrow field 'Health', instead of Broad field 'Agriculture, Forestry, Fisheries and Veterinary'.

We decided to split the following broad fields, into subcomponents:

- Broad field 'Business, Administration and Law' into the Narrow fields 'Economics, Business and Administration' (new name to reflect that economics is part of it) and 'Law'.
- Broad Field of 'Social Sciences, Journalism and Information' into the Narrow fields 'Social and Behavioural Sciences' and 'Journalism and Information'.
- Broad Field of 'Health and Welfare' into the Narrow fields 'Health' and 'Welfare'.
- Broad Field 'Engineering, Manufacturing and Construction' into the categories 'Engineering and Manufacturing' and 'Construction'.
- Broad Field 'Services' into categories 'Personal and Community Services' and 'Security and Transport'.

The show card will have examples indicating the breadth of types of education programmes that should be included in each category. We followed the following principles:

- All examples refer to the education programme instead of occupations.
- We included both examples of post-secondary vocational education and of tertiary education.
- Examples are based on the ISCED manual, although we sometimes used daily expressions: http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-fields-of-education-and-training-2013-detailed-field-descriptions-2015-en.pdf

Adaptation rules

Countries are allowed to adapt the examples in the showcard but only if these are considered more relevant for the national context. These adaptations should however follow the same principles as outlined above (so: no occupations; examples of both post-secondary vocational education and tertiary education). For example, if liberal arts are not existent in a country this can be changed into something more relevant for the national context.

Classification and showcard

1 **Economics, Business and Administration** (e.g. retail, commerce, finance, office administration, marketing, accounting, insurance)

2 **Law** (e.g. labor law, paralegal training)

3 **Health** (e.g. medicine, nursing, paramedical, pharmacy, dental studies, veterinary, psychiatry)

4 **Welfare** (e.g. social work, youth work, elderly care, child care)

5 **Social and Behavioral Sciences** (e.g. political science, psychology, cultural studies)

6 **Journalism and Information** (e.g. communication science, library studies, museum studies)

7 **Information and Communication Technologies (ICT)** (e.g. computer programming, software development, network design, database administration, informatics, computer science)

8 **Natural Sciences, Mathematics and Statistics** (e.g. biology, earth sciences, chemical lab assistance)

9 **Engineering and Manufacturing**(e.g. electronics, car mechanics, tool making, mining)

10 **Construction** (e.g. architecture, masonry, plumbing)

11 **Agriculture, Forestry, Fisheries and Environmental Studies** (e.g. farming, horticulture, animal care, environmental protection)

12 **Personal and Community Services** (e.g. hairdressing, hotel, sports, tourism, cooking, waste management, cleaning, sewing, domestic science, ergonomics)

13 **Security and Transport** (e.g. police, army training, air traffic control, postal service, crane and truck driving, transport studies)

14 **Education and Teacher training** (e.g. remedial teaching, teaching assistant, education science, didactics)

15 **Humanities, Languages and Arts** (e.g. history, translation, music, graphic design, printing, handicrafts)

16 **No main area of study or emphasis**, it was a general education programme (e.g. liberal arts)

Non-formal education

The concept non-formal education is defined as

> "education that is institutionalised, intentional and planned by an education provider. The defining characteristic of non-formal education is that it is an addition, alternative and/or complement to formal education within the process of lifelong learning of individuals. It is often provided in order to guarantee the right of access to education for all. It caters to people of all ages but does not necessarily apply a continuous pathway structure; it may be short in duration and/or low-intensity; and it is typically provided in the form of short courses, workshops or seminars. Non-formal education mostly leads to qualifications that are not recognised as formal or equivalent to formal qualifications by the relevant national or sub-national education authorities or to no qualifications at all." (Eurostat 2016).

Although a majority of training takes place in the work context (Desjardins 2014, Dieckhoff & Steiber 2011), both work-related and non-work-related training activities are measured (as in Cycle 1). The aim is to gain insights into the total training participation, also for respondents not currently working. With respect to the non-formal education part of module B, we propose some changes compared to the items in PIAAC Cycle 1. The rationale for changing the training questions was the attempt to improve the empirical measurement of non-formal education while staying as close as possible to Cycle 1 conceptually.

1. In contrast to Cycle 1, where respondents were directly asked about participation in "organized learning activities", the empirical indicator selected for PIAAC Cycle 2 is "training" because this is something respondents can better relate to when asked in the questionnaire. (In the following, we therefore often use the terms 'non-formal education' and 'training' interchangeably.)
2. The first question in this subsection of section B asks whether respondents participated in any training during the 12 months preceding the survey (B2_Q08a). To ensure that respondents do not forget about current training activities, they are advised to include them in their answer. In contrast to Cycle 1, respondents are not asked about their participation in different types of training but about their participation in *any* training. The rationale for this is that the distinction between different types of training is not relevant for respondents and the types have been shown to overlap in their meaning to respondents in the pretest. This apparent overlap in the types of training distinguished in Cycle 1 may explain the overreporting of training participation in Cycle 1. In Cycle 2, the module then includes an explicit question measuring the number of training activities (B2_Q08b). In Cycle 1 this

information had to be derived from the question on participation in different types of training instead. The new variable can be used as an indicator of the total training volume in the preceding 12 months.

3. For further improvements in wording, please see the table listing soft trend items and the rationale behind the changes below.

Furthermore, some new items were introduced in order to improve the analytical potential of this sub-section:

1. For those individuals who reported that they did not participate in training within the 12 months preceding the survey, the module includes a question asking whether the respondent participated in training at any point in their adult life (B2_Q09). This innovation enables researchers to identify persons who are completely abstinent from training and thus provides some further information on human capital accumulation over the life cycle.
2. A new item was included on the content taught in the training (B2_Q10). This item is introduced in order to obtain information on the main focus of the training, and on the kinds of skills respondents could acquire during training. The response categories have been adapted from the Continuing Vocational Training Survey (CVTS) 2015 and were extended to also cover non-job-related training.
3. A question is added which deals with digitalization and the importance of technological changes in the occupational domain (B2_Q16c). It aims at understanding whether respondents undertook training dealing with new technologies to improve their work performance. The goal of this item is to capture whether, in the context of digitalization, respondents are prepared and trained for ICT changes at their workplace.
4. New questions are asked about important characteristics of the training: 1) Mode of administration (face-to-face, distance, or blended learning); 2) schedule (recurring sessions over several weeks or months, an event concentrated on one or several consecutive days). For respondents who were employed during their last training activity, it is also assessed whether the training activity took place in their normal work environment (B2_Q13a, B2_Q13d; B2_Q16a). This information is hoped to be more reliable and useful than asking about types of training activities such as workshops, seminars, guided on-the-job-training and distance education, which were shown in the pretest to strongly overlap and partly misunderstood.

5. Finally, a new question is included to measure whether the training leads to a certification that can be used to make human capital acquisition in non-formal education visible, e.g. on the labour market (B2_Q18) (Pischke 2001).

In Cycle 1, respondents who were employed while participating in training were asked whether their employer paid (part of) the costs associated with training. However, there was no information on further funding sources. For Cycle 2 this information will be collected using a checkbox item, i.e. allowing the combination of several sources of funding. They are asked about all contributors to training costs (self-funding; employer, public employment agency; other public funding, e.g. trade unions or associations; other private sources, e.g. family members) (B2_Q20).

List of strict trend items in Module B

Cycle 1	**Cycle 2**	**Indicator**
B_Q01c1 B_Q01c2	B2_Q04b1 B2_Q04b2	Age obtained highest qualification Year obtained highest qualification
B_Q02a	B2_Q05a	Current participation in formal education
B_Q03a	B2_Q06a	Started studying without completing qualification
B_Q03c1	B2_Q06c1	Age when stopped studying for qualification that was not completed
B_Q03c2	B2_Q06c2	Year when stopped studying for qualification that was not completed

List of soft trend items in Module B

Cycle 1	**Cycle 2**	**Indicator**	**Rationale**
B_Q01a	B2_Q01	Educational attainment	PIAAC Cycle 1 made use of the old version of ISCED (ISCED 1997) as the new one was not yet implemented at the time the national versions of the BQ were developed. For PIAAC Cycle 2 we use a coding scheme based on ISCED 2011, distinguishing a maximum of 29 different categories: this allows a good
B_Q02b	B2_Q05b	Qualification currently studying for	
B_Q03b	B2_Q06b	Education started but not completed	

			differentiation between different levels and types of qualifications
B_Q01b B_Q02c	B2_Q04a B2_Q05c	Main area of study for highest qualification Main area of study for currently pursued qualification	We have used a new classification based on ISCED-F 2013.
B_Q14a	B2_Q11	Training mainly job-related	The term “activity” was changed into “training activity” for consistency reasons. Furthermore, the content of the interviewer instruction was included in the item itself (after some rewording) following suggestions resulting from the pretest.
B_Q14b	B2_Q12	Main reason for participating in training	Some response categories were changed compared to Cycle 1, partly because they overlapped. One category was added to get information about important aspects not covered in Cycle 1 (“To better deal with new or changing work tasks”). The first response category, "To do my job better and/or improve career prospects" was split up for Cycle 2 and three categories which were not mentioned frequently in Cycle 1 or that overlapped with other response options were deleted ("To be less likely to lose my job"; "To increase my possibilities of getting a job, or changing a job or profession"; “To start my own business”). In the category "To obtain a certificate", the aspect of renewing a certificate was included

			following the pretest. The wording of the question was changed slightly by dropping "more precisely" which was regarded as redundant.
B_Q15a	B2_Q15	Employment status when participating in training	In Cycle 1, this item only asked whether the respondent was employed (full- or part-time). This was broadened to include other statuses.
B_Q15b	B2_Q16b	Participating in training during working hours	The interviewer instructions were simplified, and the broken stem style changed to a complete question.
B_Q15c	B2_Q17	Usefulness of training for job	Wording of question was simplified.
B_Q17-20a	B2_Q21	Total time spent on training	The measurement of total time spent on training was changed asking only for the number of hours spent on the last training activity. This was done after the pretest results indicated that this measure resulted in mostly the same kind of answers as in the more complex set of questions.
B_Q26a	B2_Q22	Barriers to training	The wording of this item was adjusted to exclude formal education.
B_Q26b	B2_Q23	Barriers to training - reasons	The response categories were slightly changed compared to Cycle 1 and include new categories in order to cover more different areas which might deter respondents from participation education and training.

List of new items in Module B

Cycle 2	**Indicator**
B2_Q02a B2_Q02b	Obtained other qualifications Which other qualifications obtained
B2_Q03a	Highest education obtained in country
B2_Q03b	Country of highest education
B2_S03b	Other country of highest foreign education
B2_Q04c	Month obtained highest qualification
B2_Q08a	Participation in training
B2_Q08b	Number of training activities in the last 12 months
B2_Q09	Participation in training beyond 12 months
B2_Q10	Main focus of training
B2_Q13a;	Mode of administration of training
B2_Q13d	Scheduling of training
B2_Q16a	Training took place in normal work environment
B2_Q16c	Training for improving work performance by digitalization
B2_Q18	Certificate for participation in training
B2_Q20	Who paid for costs of training

Module C – Current status and work history

The PIAAC Cycle 1 BQ contained a long list of questions based on the EU Labour Force Survey to derive the labour force status according to EUROSTAT definitions. Although this worked quite well, there was a feeling that this comprised a lot of questions for people currently not working (10-12 questions) on detailed job search behaviour that were ultimately only used to determine whether someone is unemployed or not, but that were hardly used for other purposes, if at all. Unlike the EU-LFS (and comparable surveys that are held in almost all non-European countries) PIAAC is not designed to measure employment status for statistical purposes. There is a strong need for a measure of labour force status in PIAAC that is conceptually and empirically strongly related to that used in LFS, but it is not necessary that it is strictly identical. For this reason the detailed set of questions on specific search behaviours has been dropped, and the word "ACTIVELY" (plus a few examples of active search behaviours) has been added to the question on whether the respondent has been looking for work in the last 4 weeks. In addition, the question on whether respondents waiting to start a new job expected to do so within the next three months has also been dropped. This was not used to derive labour force status in Cycle 1 and appears to serve no clear analytical purpose.

List of strict trend items in Module C

Cycle 1	**Cycle 2**	**Indicator**
C_Q01a	C2_Q01a	PAID work in the last week
C_Q01b	C2_Q01b	Temporarily away from a job or business in the last week
C_Q01c	C2_Q01c	UNPAID work in own or family business in the last week
C_Q02b	C2_Q02b	Waiting to start a job
C_Q03	C2_Q03	Reasons for not looking for work
C_S03	C2_Q04	Job search duration
C_Q05	C2_Q05	Available to start work within 2 weeks
C_Q06	C2_Q06	Number of jobs
C_Q08a	C2_Q09a	Ever had paid work
C_Q08b	C2_Q09b	Paid work in last 12 months
C_Q08c1 C_Q08c2	C2_Q09c1 C2_Q09c2	Age stopped working Year stopped working
C_Q09	C2_Q10	Total years in paid work
C_Q10a	C2_Q12	Number of firms or organizations in last 5 years

List of soft trend items in Module C

Cycle 1	**Cycle 2**	**Indicator**	**Rationale**
C_Q02a	C2_Q02a	ACTIVELY looking for paid work	The word "ACTIVELY" plus examples have been added to this question.
C_Q07	C2_Q07	Self-reported current situation	Changed the category "apprentice, internship" into "apprentice, intern" for consistency reasons. The other categories remained unchanged.

List of new items in Module C

Cycle 2	**Indicator**
C2_Q08a C2_Q08b	Total time out of work in last 5 years
C2_Q11	Unemployment benefits, disability benefits, sickness benefits or retirement benefits

Two items have been added to this module to measure the total time spent out of work in the last five years. An item was also added indicating whether the respondent received any benefit payments in connection with unemployment, disability or retirement. All three added items were taken and modified from the Cycle 1 Field Test BQ.

Module D – Current work

This module gives key descriptive indicators of the jobs held by those currently in employment. Most of module D is retained with the exception of a few minor changes. Some items are revised in order to bring them in line with other international surveys or to keep track of the ongoing changing world. A new item measuring the changes in the job role was added.

List of strict trend items in Module D

Cycle 1	**Cycle 2**	**Indicator**
D_Q01a	D2_Q01a	Job title
D_Q01b	D2_Q01b	Most important responsibilities in job
D_Q02a	D2_Q02a	Kind of business, industry or service
D_Q02b	D2_Q02b	Firm or organisation
D_Q03	D2_Q03	Sector
D_Q04	D2_Q04	Employee or self-employed
D_Q05a1 D_Q05a2 D_Q05a3	D2_Q05a1 D2_Q05a2 D2_Q05a3	Age start working current employer Year start working current employer Month start working current employer
D_Q05b1 D_Q05b2 D_Q05b3	D2_Q05b1 D2_Q05b2 D2_Q05b3	Age start working in current business Year start working in current business Month start working in current business
D_Q06b	D2_Q07b	Change in organisation size
D_Q06c	D2_Q07c	Part of larger organisation
D_Q07a	D2_Q08a	Employees working for you
D_Q08a	D2_Q09a	Supervisory status
D_Q08b	D2_Q09b	Number of subordinates
D_S09	D2_S10	Specify type of contract
D_Q10	D2_Q11	Working hours
D_Q12c	D2_Q12d	Required work experience
D_Q14	D2_Q13	Job satisfaction
D_Q16a D_S16a	D2_Q14a D2_S14a	Earnings basis

D_Q16b D_Q16c	D2_Q14b D2_Q14c	Usual gross pay
D_Q16d1 D_Q16d2 D_Q16d3 D_Q16d4 D_Q16d5 D_Q16d6	D2_Q14d1 D2_Q14d2 D2_Q14d3 D2_Q14d4 D2_Q14d5 D2_Q14d6	Specification plausible hourly wage
D_Q17a	D2_Q15a	Additional earnings?
D_Q17b	D2_Q15b	How much additional earnings?
D_Q17c	D2_Q15c	Prepared to answer in broad categories
D_Q17d	D2_Q15d	Broad ranges for additional payments
D_Q18a D_Q18b	D2_Q16a D2_Q16b	Earnings from business
D_Q18c1 D_Q18c2	D2_Q16c1 D2_Q16c2	Broad earnings ranges for self-employed

List of soft trend items in Module D

Cycle 1	**Cycle 2**	**Indicator**	**Rationale**
D_Q06a D_Q07b	D2_Q07a D2_Q08b	Firm size Number of employees	The answer categories for firm size are changed to bring them in line with the international definition. This was recommended by the working group on 'Skills use and mismatch'. See document 'Improving the measurement of skills use and mismatch in the second cycle of PIAAC' (pp. 17). Former categories in Cycle 1: Categories in Cycle 2: 1 1 to 10 people 1. 1 to 10 people 2 11 to 50 people 2. 11 to 49 people 3 51 to 250 people 3. 50 to 249 people 4 251 to 1000 people 4. 245 to 499 people 5 more than 1000 people 5. 500 to 999 people 6. 1000 or more people

D_Q09	D2_Q10	Type of contract	The answer categories for the contract type are updated to bring them in line with the ongoing change on the labour market. Two contract types are added: a zero hour contract and a freelance, contractor and/or consultant contract. Also, seasonal contracts are now explicitly mentioned with the fixed term contracts category. This was recommended by the working group on 'Skills use and mismatch'. See document 'Improving the measurement of skills use and mismatch in the second cycle of PIAAC' (pp. 17). Former categories in Cycle 1: 1 An indefinite contract 2 A fixed term contract 3 A temporary employment agency contract 4 An apprenticeship or other training scheme 5 No contract 6 Other New categories in Cycle 2: 1 An indefinite contract 2 A fixed term contract, including seasonal contract 3 A temporary employment agency contract 4 A zero hour contract 5 A freelance, contractor and/or consultant contract 6 An apprenticeship or other training scheme 7 No contract 8 Other
D_Q12a	D2_Q12a	Required education for getting current job	PIAAC Cycle 1 made use of the old version of ISCED (ISCED 1997) as the new one was not yet implemented at the time the national versions of the BQ were developed. For PIAAC Cycle 2 we use a

			coding scheme based on ISCED 2011, distinguishing a maximum of 28 different categories: this allows a good differentiation between different levels and types of qualifications

List of new items in Module D

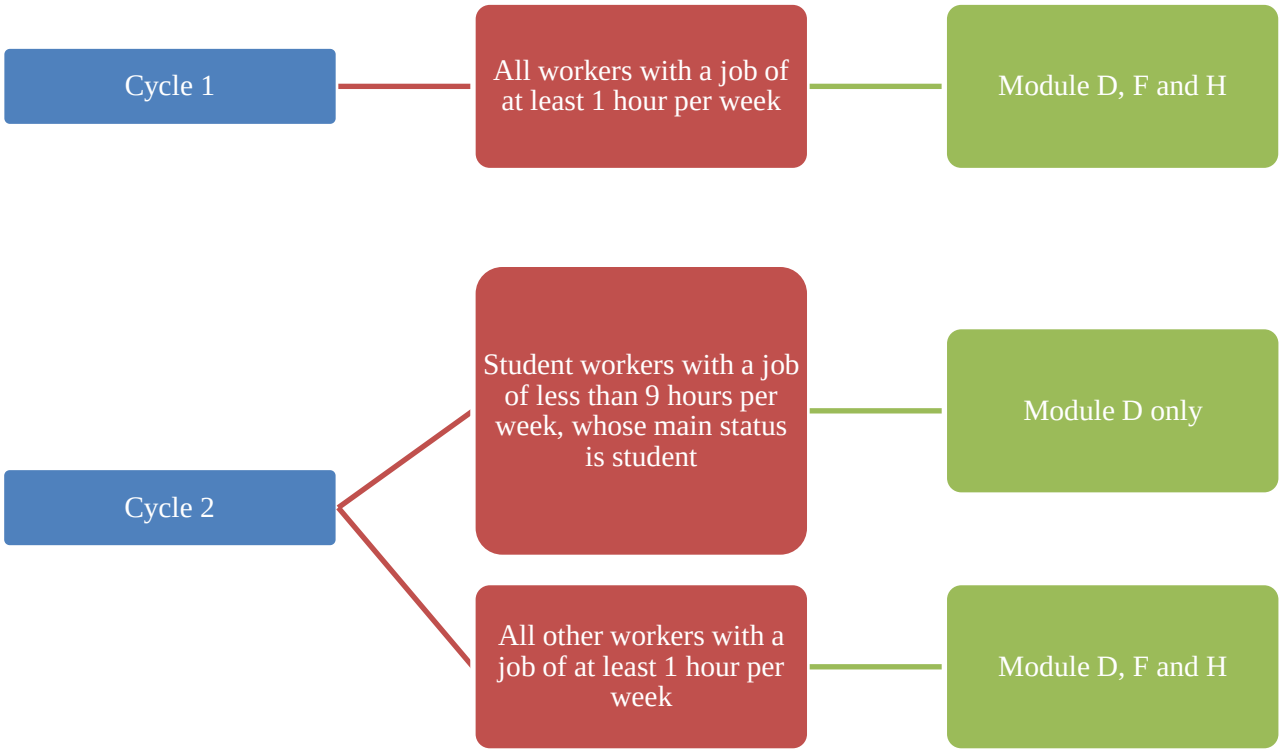
New items	**Indicator**
D2_Q06a	Changes in job level
D2_Q06b	Changes in tasks and responsibilities
D2_Q06c	Changes in department or unit
D2_Q12b	Qualification to get the job is also qualification to do the job
D2_Q12c	Required education for doing current job

Three new items (D2_Q06) on changes in the job role were added to reflect on recent trends towards increased flexibility in labour markets across participating countries. These questions were derived and modified from the 'Cedefop Skills and Jobs Survey (CJSJ)', and were recommended by the working group on 'Skills use and mismatch'. See document 'Improving the measurement of skills use and mismatch in the second cycle of PIAAC' (pp. 16).

In addition to questions about the qualification required to get the job, we added a question on whether this is also the qualification required to do the job satisfactorily. This allows us to distinguish the role of underqualification in getting jobs and in performing on the job.

Finally, this module contains the routing to the modules F and H for people who are currently working. In PIAAC Cycle 1, we followed the EUROSTAT definition for labour force status and routed everyone who worked for at least 1 hour per week in the last week to the modules on skills used in current work (former modules F and G). This implies for example that all students that have a side-job of at least 1 hour per week will get these modules as well. However, in most of the analyses, this group is explicitly dropped from the analyses, so that the actual need to ask these questions is very low. We now make a distinction in the routing. Workers who are currently in education and identify their own current status as 'student' and work less than 9 hours per week will be routed to Module G, all others will go to Module F. Note that workers who identify themselves as 'apprentice or intern' are also routed to Module F as these people have a double status as student and worker.

Figure 1. Explaining difference in routing between Cycle 1 and 2



Module E – Last job

This module gives key descriptive indicators of the jobs held by those who are not currently working but had paid work in the past 5 years. Most items in this module were kept as trend items.

List of strict trend items in Module E

Cycle 1	**Cycle 2**	**Indicator**
E_Q01a	E2_Q01a	Job title of last job
E_Q01b	E2_Q01b	Most important responsibilities in last job
E_Q02a	E2_Q02a	Kind of business, industry or service
E_Q02b	E2_Q02b	Firm or organisation
E_Q03	E2_Q03	Sector
E_Q04	E2_Q04	Employee or self-employed
E_Q05a1 E_Q05a2	E2_Q05a1 E2_Q05a2	Age start working former employer Year start working former employer
E_Q05b1 E_Q05b2	E2_Q05b1 E2_Q05b2	Age start working in former business Year start working in former business
E_Q07a	E2_Q07a	Employees working for you
E_S08	E2_S08	Specify former contract type
E_Q09	E2_Q09	Working hours in last job

List of soft trend items in Module E

Cycle 1	**Cycle 2**	**Indicator**	**Rationale**
E_Q06 E_Q07b	E2_Q06 E2_Q07b	Firm size Number of employees	The answer categories for firm size are changed to bring them in line with the international definition. This was recommended by the working group on 'Skills use and mismatch'. See document 'Improving the measurement of skills use and mismatch in the second cycle of PIAAC' (pp. 17). Former categories in Cycle 1: Categories in Cycle 2 1 1 to 10 people 1. 1 to 9 people

			2 11 to 50 people 2. 10 to 49 people 3 51 to 250 people 3. 50 to 249 people 4 251 to 1000 people 4. 250 to 499 people 5 more than 1000 people 5. 500 to 999 people 6. More than 1000 people
E_Q10	E2_Q08	Type of contract in last job	The answer categories for the contract type are updated to bring them in line with the ongoing change on the labour market. Two contract types are added: a zero hour contract and a freelance, contractor and/or consultant contract. Also, seasonal contracts are now explicitly mentioned with the fixed term contracts category. This was recommended by the working group on 'Skills use and mismatch'. See document 'Improving the measurement of skills use and mismatch in the second cycle of PIAAC' (pp. 17). Former categories in Cycle 1: 1 An indefinite contract 2 A fixed term contract 3 A temporary employment agency contract 4 An apprenticeship or other training scheme 5 No contract 6 Other New categories in Cycle 2: 1 An indefinite contract 2 A fixed term contract, including seasonal contract 3 A temporary employment agency contract 4 A zero hour contract 5 A freelance, contractor and/or consultant contract 6 An apprenticeship or other training scheme 7 No contract 8 Other

List of new items in Module E

New items	**Indicator**
E2_Q10a	Required education for getting last job
E2_Q10b	Qualification to get the job is also qualification to do the job
E2_Q10c	Required education for doing last job
E2_Q10d	Required work experience
E2_Q11a	Stopped working in last job voluntarily or involuntarily
E2_Q11b	Main reason stopped working in last job

As for the current job in Module D, we added questions on underqualification for the last job. Again, in addition to questions about the qualification required to get the job, we added a question on whether this is also the qualification required to do the job satisfactorily. This allows us to distinguish the role of underqualification in getting jobs and in performing on the job.

Finally, as replacement for the measure on the main reason respondents stopped working in the last job used in Cycle 1, we have added a question on whether the respondent stopped working voluntarily or involuntarily. After that the main reason they stopped working is asked in a separate question. This first question is important as someone can stop working voluntarily because of the financial problems of their organisation, but also involuntarily. It also makes a couple of unclear/overlapping categories redundant.

Module F and G – Literacy, numeracy, and ICT practices at work and in everyday life

Conceptually most of the items in these sections closely match those in the corresponding modules in the Cycle 1 BQ (modules G and H in that case). There was a prolonged period of consultation and discussion as to the extent to which revisions were needed in the light of the experiences from the first Cycle and potential substantive changes in the manner in which literacy, numeracy and ICT are used in today's world. A specific point of discussion was whether it was appropriate to use items that are substantively identical when measuring skill use at work and in everyday life. A consensus emerged that, although different wordings should be avoided whenever the same wording would work equally well across both settings, it is not necessary for the lists to be strictly identical (as was the case in PIAAC Cycle 1), and that different wordings should be applied when it makes sense to do so, for example when a particular activity would be regarded as uncommon or unusual outside a work setting.

The list of items used to measure reading skill use was subject to only relatively minor changes. For reading skill use at work, two previously separate items – [How often do you] "read articles in professional journals or scholarly publications?" and "read books?" - were combined to form a single item: [How often do you] "read books, scholarly publications, or articles in professional journals?" For reading skill use in everyday life, the former item was dropped, as it was felt that such professional or scholarly reading would be highly uncommon in a non-work setting. The corresponding original item on reading books was retained: [How often do you] "read books, fiction or non-fiction?". For both domains an additional item was added to the list: [How often do you] "read posts or commentaries on social media (e.g. blogs, Facebook, Twitter)?". Although the use of social media in a work context may only be a set of highly specialized jobs, both the OECD and the Literacy Expert Group (LEG) have indicated that they would prefer to keep this for the Field Test. It should be noted that the references to Facebook and Twitter can and should be adapted to local contexts when this is appropriate.

For writing skill use at work, two existing items – [How often do you] "write articles for newspapers, magazines or newsletters? and "write reports?" were combined to form a single item: [How often do you] "write reports or articles?". It was felt that the distinction between reports and articles was quite obscure, and that the restriction of articles to newspapers, magazines and newsletters was unnecessarily narrow. As for reading, an item was added pertaining to social media: [How often do you] "write posts or commentaries on social media

(e.g. blogs, Facebook, Twitter)?". The same set of items was used for writing skill use in everyday life.

For the numeracy domain the changes were more substantial. The total number of items used has been reduced and the items are generally somewhat broader and more generic, covering five broad domains. For numeracy skill use at work these domains can be broadly described in terms of calculation ([How often do you] "undertake calculations, such as calculating prices, costs or quantities?"), spatial orientation ("…use maps, plans or GPS for finding directions and locations?"), measurement ("…undertake measurements such as lengths, weights, temperatures, dosages, areas or volumes?"), quantitative representation ("…read and prepare charts, graphs or tables?") and mathematics/statistics ("…use advanced mathematics or statistics?"). For everyday life the domains of calculation, measurement, quantitative representation and mathematics/statistics were also used, but in the case of measurement and mathematics/statistics a slightly different item formulation was applied ("…undertake measurements (e.g. when you cook, garden, make clothes or undertake repairs?" and "…use mathematics, such as formulas or mathematical rules?" respectively). Instead of the domain spatial orientation, for everyday life an item was included that can be described as representing the domain of financial decision making "…use information to make financial decisions (e.g. household budgets, insurance, loans)?".

As is the case for numeracy, there was also considerable revision of the set of items on ICT skill use. In part this was needed to bring this domain up to date in terms of the kind of technologies used in today's world. But as with numeracy skill use, the items chosen are broader and more generic. For ICT skill use at work, the chosen items can be broadly described in terms of the use of ICT for communication ([How often do you usually use a computer or digitial device such as a tablet or smartphone for the following purposes?] "To communicate with others (e.g. via emails, social networking sites, or internet calls). Exclude normal phone calls using a mobile phone"), information search and retrieval ("To access information (e.g. use a search engine, find information, or read documents)"), document processing ("To create or edit electronic documents, spreadsheets or presentations (using software like Microsoft Word, Excel, PowerPoint, or similar software)"), specialized software use ("To use specialized software (e.g. for computer-aided design, the processing or analysis of data, sound and images, or quality control)") and programming ("To use a programming language to program software (e.g. applications) websites"). For ICT use in everyday life, the domains of communication and

information search and retrieval are also found. The other domains applied in everyday life can be described in terms of entertainment (([How often do you usually use a computer or digitial device such as a tablet or smartphone for the following purposes?] "For entertainment or leisure (e.g. play video games, listen to music, watch or edit videos or photos)", online banking and e-commerce ("For online banking or e-commerce (e.g., buying or selling of goods or services)") and personal life management ("To manage your personal life (e.g., track your health information, manage your household budget, or navigate via GPS)").

List of strict trend items in Module F

Cycle 1	**Cycle 2**	**Indicator**
G_Q01a	F2_Q01a	Read directions and instruction
G_Q01b	F2_Q01b	Read letters, memos or e-mails
G_Q01c	F2_Q01c	Read articles in newspaper, magazines or newsletters
G_Q01f	F2_Q01e	Read manuals or reference materials
G_Q01g	F2_Q01f	Read bills, invoices, bank statements or other financial statements
G_Q02a	F2_Q02a	Write letters, memos or emails
G_Q02d	F2_Q02c	Fill in forms
G_Q04	F2_Q04	Use a computer

List of strict trend items in Module G

Cycle 1	**Cycle 2**	**Indicator**
H_Q01a	G2_Q01a	Read directions and instruction
H_Q01b	G2_Q01b	Read letters, memos or e-mails
H_Q01c	G2_Q01c	Read articles in newspaper, magazines or newsletters
H_Q01e	G2_Q01d	Read books, fiction or non-fiction
H_Q01f	G2_Q01e	Read manuals or reference materials
H_Q01g	G2_Q01f	Read bills, invoices, bank statements or other financial statements
H_Q02a	G2_Q02a	Write letters, memos or emails
H_Q02d	G2_Q02c	Fill in forms

List of soft trend items in Module F

Cycle 1	Cycle 2	Indicator	Rationale
G_Q03f	F2_Q03d	Read and prepare charts, graphs or tables	An important use of graphs and charts is the ability **to read** them, not to just prepare them. Therefore the wording changed in 'read and prepare' instead of 'prepare'.
G_Q03h	F2_Q03e	Use advanced mathematics or statistics	These items are compared to Cycle 1 generally somewhat broader and generic.
G_Q05c	F2_Q05c	Use ICT to access information	
G_Q05g	F2_Q05f	Use ICT to use a programming language to program software	

List of soft trend items in Module G

Cycle 1	Cycle 2	Indicator	Rationale
H_Q03f	G2_Q03d	Read and prepare charts, graphs or tables	An important use of graphs and charts is the ability **to read** them, not to just prepare them. Therefore the wording changed in 'read and prepare' instead of 'prepare'.
H_Q05c	G2_Q06b	Use ICT to access information	The item is generally somewhat broader and generic.

List of new items in Module F

New items	Indicator
F2_Q01d	Read books, scholarly publications, or articles in professional journals
F2_Q01g	Read posts or commentaries on social media
F2_Q02b	Write reports or articles
F2_Q02d	Write posts or commentaries on social media
F2_Q03a	Undertake calculations
F2_Q03b	Use maps, plans or GPS for finding directions and locations
F2_Q03c	Undertake measurements

F2_Q05a	Use ICT to communicate with others
F2_Q05d	Use ICT to create or edit electronic documents, spreadsheets or presentations
F2_Q05e	Use ICT to use specialized software

List of new items in Module G

New items	**Indicator**
G2_Q01g	Read posts or commentaries on social media
G2_Q02b	Write reports or articles
G2_Q02d	Write posts or commentaries on social media
G2_Q03a	Undertake calculations
G2_Q03b	Use information to make financial decisions
G2_Q03c	Undertake measurements
G2_Q03e	Use mathematics
G2_Q04	Ever used smartphone, tablet, laptop or desktop computer
G2_Q05a	How often use smartphone
G2_Q05b	How often use tablet
G2_Q05c	How often use desktop computer
G2_Q06a	Use ICT to communicate with others
G2_Q06c	Use ICT for entertainment or leisure
G2_Q06d	Use ICT for online banking or e-commerce
G2_Q06e	Use ICT to manage your personal life

Module H – Working environment

This module gives key descriptive indicators of the working environment of those currently in employment. The 1st cycle of PIAAC contributed in the area of labour market policy and research as it contained questions on the skills use at work (Module F: JRA). Even though Cycle 2 has to maintain continuity with Cycle 1, the analytical power in understanding skill use and mismatch could be improved. This module is therefore an adaptation and extension of the JRA module (former Module F) in Cycle 1. The efforts of the working group on 'Skills use and mismatch' to replace the JRA from Cycle 1 by a more holistic approach towards the working environment created space for a stronger and more elaborate module on the working environment.

List of strict trend items in Module H

Cycle 1	**Cycle 2**	**Indicator**
F_Q02a	H2_Q03a	Job involve sharing work-related information with co-workers
F_Q02b	H2_Q03b	Job involve instructing, training or teaching people
F_Q02c	H2_Q03c	Job involve making speeches/presenting
F_Q03a	H2_Q04a	Job involve planning own activities
F_Q03c	H2_Q04b	Job involve organising own time
F_Q04a	H2_Q05a	Job involve persuading/influencing people
F_Q04b	H2_Q05b	Job involve negotiating with people
F_Q05a	H2_Q06a	Problem solving tasks in job: relatively simple problems
F_Q05b	H2_Q06b	Problem solving tasks in job: complex problems
F_Q06b	H2_Q07a	Work physically
D_Q11a	H2_Q08a	Work autonomy: choose/change sequence tasks
D_Q11b	H2_Q08b	Work autonomy: choose/change how to work
D_Q11c	H2_Q08c	Work autonomy: choose/change speed or rate
D_Q11d	H2_Q08d	Work autonomy: choose/change working hours
D_Q13b	H2_Q09b	Learning-by-doing
D_Q13c	H2_Q09c	Keep up to date with new products/services

Note that the questions on work autonomy and learning environment (D_Q11a-d and D_Q13b-c) were moved from section D (current work) to section H. These questions were moved to this module, since the concepts better fits in the section on the working environment.

List of soft trend items in Module H

Cycle 1	Cycle 2	Indicator	Rationale
F_Q01b	H2_Q01	Cooperating or collaborating with co-workers	In Cycle 1 this question was asked with a broken stem (In your ^JobLastjob what proportion of your time ^DoDid you usually spend…). This is however not necessary as only 1 question is asked in this section. Therefore in Cycle 2 it changed into a complete question with dynamic text: 'In your current job (last job) what proportion of your time do (did) you usually spend cooperating or collaborating with co-workers?'
F_Q06c	H2_Q07b	Work using skill with hand	The wording was changed to avoid that respondents consider e.g. typing when answering to this question.

List of new items in Module H

New items	Indicator
H2_Q02a	Permanent/temporary team
H2_Q02b	Team leader
H2_Q02c	Influence selection team leader
H2_Q02d	Influence work targets for group
H2_Q02e	Influence others on tasks
H2_Q03d	Job involve dealing with people who are not employees at the workplace
H2_Q09a	Learning new things
H2_Q10	Helping co-workers learn new things
H2_Q11	Determining nature or content of work
H2_Q12	Working to tight deadlines/high speed
H2_Q13a	Need for assistance
H2_Q13b	Receive assistance from supervisor/manager
H2_Q13c	Receive assistance from co-workers
H2_Q14a	Involved in improving work organisation
H2_Q14b	Apply own ideas in work
H2_Q15a	Performance appraisal/evaluation interview

H2_Q16	Consequences performance appraisal
H2_Q17	Short repetitive tasks
H2_Q18a	Changes in workplace
H2_Q18b	Changes supported by training activities
H2_Q19a	Skills in relation to what is required
H2_Q19b	Specific skills in relation to what is required
H2_Q20	Skills in relation to what is required when started job

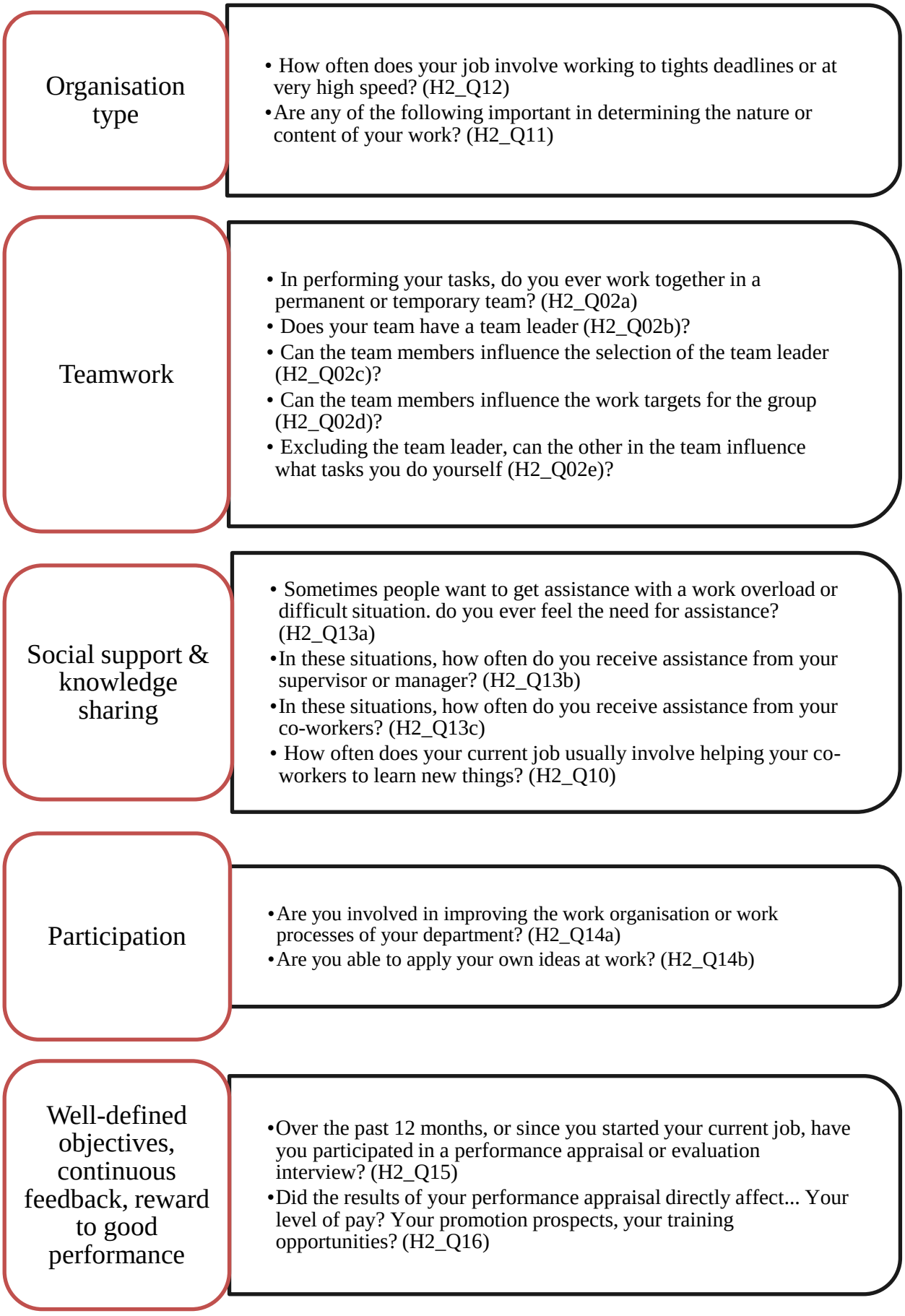
The question on the extent to which respondents are involved in selling a product or selling a service (former F_Q02d) is replaced by a question measuring the extent that respondents are involved, as part of their work, in dealing with people who are not employees at their workplace, such as customers, passengers, pupils or patients (H2_Q03d). This replacement makes it possible to fully measure the use of social skills and not only the ability to sell items. Giving the increasing importance of social skills in work and the confirmation of its importance in the pilot study conducted by the working group on 'Skills use and mismatch', the item was replaced.

The question on learning new work-related things from co-workers or supervisors (former D_Q13a), is changed into a more general question on learning new things (H2_Q09a). Learning new things is thus no longer restricted to learning from co-workers or supervisors.

With regard to the other new questions, these are related to the so-called 'High Performance Work Practices (HPWPs)'. The working group on 'Skills use and mismatch' argues that these practices can increase firms' internal flexibility to adapt job tasks to the skills of new hires, while also promoting a better allocation of the workforce to the required tasks, suggesting one potential channel related to skills use and skills mismatch. It was also suggested that some HPWPs may encourage the deployment of skills at work by increasing motivation among workers. To strengthen these initial findings, better information is needed on the characteristics of the work environment which would help shed light on the potential mechanisms and on the practices that are particularly effective. This existing evidence and remaining knowledge gaps prompted the working group on "Skill use and mismatch" to suggest the inclusion of several questions on working environment in Cycle 2. In Figure 1 these new items are related to the HPWPs. All new questions are derived from existing international surveys.

Aside from collecting additional information on HPWPs, three questions were added to measure two aspects of employment increasingly important from a policy point of view: how automatable jobs are and how mega trends, such as technological progress, have affected the workplace. For that purpose, new items H2_Q17, H2_Q18a and H2_Q18b are included in module H.

Figure 1. Dimensions of HPWPs with the new items from Module H



Module I – Non-economic outcomes

This module contains several indicators of non-economic outcomes and personal preferences. For this module, there was a need to cover a broader range of non-economic outcomes (without extending the total interview time). Items on voluntary work and self-reported health were taken directly from Module I in the Cycle 1 BQ. Two new items were added, one on patience and the other on general life satisfaction, both taken from existing international surveys (respectively: Global Preference Survey and European Social Survey). For political trust and social trust, two new items were used (both taken from the European Social Survey) rather than using the items from Cycle 1 to bring these scales more in line with other cross-national surveys, and with the other scales used in this module.

List of strict trend items in Module I

Cycle 1	**Cycle 2**	**Indicator**
I_Q05f	I2_Q02	Voluntary work
I_Q08	I2_Q03	General subjective health

List of new items in Module I

Cycle 2	**Indicator**
I2_Q01a	Political trust
I2_Q01b	Social trust
I2_Q04	Patience
I2_Q05	Life satisfaction

Module J – Background

Although many of the items in Module J were retained, there was also a need to broaden the scope a bit. More specifically, there was a need to extend the background information collected, in particular with respect to the situation in the respondent's childhood home. The rationale behind this was the large body of research literature pointing to the importance of the childhood home as a formative influence on people's cognitive and social and emotional development, that has been shown to be comparable or in some cases perhaps even more important than more institutionalized forms of learning via education and training.

List of strict trend items in Module J

Cycle 1	**Cycle 2**	**Indicator**
J_Q01	J2_Q01	Household composition
J_Q02a	J2_Q02a	Cohabitation status
J_Q03a	J2_Q03a	Children
J_Q03b	J2_Q03b	Number of children
J_Q03c	J2_Q03c	Age of only child
J_Q03d1	J2_Q03d1	Age of youngest child
J_Q03d2	J2_Q03d2	Age of oldest child

List of soft trend items in Module J

Cycle 1	**Cycle 2**	**Indicator**	**Rationale**
J_Q02c	J2_Q02b	Current situation spouse or partner	Changed the category "apprentice, internship" into "apprentice, intern" for consistency reasons. The other categories have remained unchanged.
J_Q06b	J2_Q04b	Highest education mother	ISCED categories changed
J_Q07b	J2_Q05b	Highest education father	ISCED categories changed
J_Q08	J2_Q06	Number of books in childhood household	Reference age changed to age 14 to bring in line with other international surveys that use age 14 as a reference age.

The question on the number of books was modified slightly to refer to the household as it was when the respondent was aged 14, rather than at age 16. This change was made to bring this question in line with other questions on the situation in the respondent's childhood household. Since the importance of the childhood situation lies in its potential formative influence on the respondent's cognitive and social and emotional development, it was felt that the reference age should be as young as reasonably possible, given the limitations on memory. Age 14 was a compromise: young enough to be indicative of the situation in the respondent's "formative years", but not so young as to be beyond most respondents' powers of recall.

List of new items in Module J

Cycle 2	**Indicator**
J2_Q04a	Mother/female guardian present during childhood
J2_Q04d	Mother's employment
J2_Q04e	Mother's job title
J2_Q04f	Mother's occupation
J2_Q05a	Father/female guardian present during childhood
J2_Q05d	Father's employment
J2_Q05e	Father's job title
J2_Q05f	Father's occupation
J2_Q07	Level of urbanization of residence at age 14
J2_Q08	Household composition at age 14
J2_Q09a	Number of siblings
J2_Q09b	Birth order
J2_Q09c	

Items were added on the parents' occupation at age 14, which has been shown to have an effect on people's development and life chances that is independent of, and no less important than, parental education. With the exception of the change of reference age, these questions were directly taken from the Cycle 1 Field Test BQ, which means that they have been fully tested, translated and verified. Additional questions were added on the degree of urbanization of the childhood home environment, the "relevant others" present in the childhood household, number of siblings and the respondent's birth order. These items were taken, sometimes in slightly modified form, from existing international surveys.

Module K – Social and emotional skills

This module gives key descriptive indicators of social and emotional skills, which is a new concept to be measured in PIAAC Cycle 2. The inclusion of a dedicated module aimed at measuring social and emotional skills was one of the key priorities for change in the design of Cycle 2 of PIAAC (OECD 2017; Martin 2018). This decision was based on a growing evidence base showing that social and emotional skills can be highly important in fostering cognitive development; and that social and emotional skills have often substantial effects on important life outcomes (e.g., income, health, social participation) in their own right – above and beyond cognitive ability. Against that background, the addition of this module is expected to add considerable depth and richness to analyses on the potential causes and consequences of cognitive skill development; as well as on the social and economic returns to social and emotional skills, including cross-national variation therein.

With that in mind, the OECD commissioned a working group to develop a proposal for how such a module could be implemented. This working group conducted a thorough review of the relevant literature in the field of personality psychology to identify basic dimensions or factors that could be used to describe a wide range of personality attributes. The most widely used and best-validated model of personality traits is the so called 'Big Five' model, in which a range of detailed traits (called "facets") is subsumed under five higher order dimensions: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Emotional Stability (or its inverse, Neuroticism). For the current BQ, the working group on social and emotional skills suggested implementing an established and internationally validated 30-item short version of Big Five Inventory (BFI-2-S; Soto & John 2017) to measure social and emotional skills. The inclusion of social and emotional skills in PIAAC Cycle 2 represents a key innovation over existing surveys and enables the examination of the interplay between cognitive and social and emotional skills.

New items	**Indicator** **(Dimension - Facet)**
K2_Q01a	Extraversion - Sociability
K2_Q01b	Agreeableness - Compassion
K2_Q01c	Conscientiousness - Organization
K2_Q01d	Emotional Stability - Anxiety

K2_Q01e	Open-Mindedness - Aesthetic Sensitivity
K2_Q02a	Extraversion - Assertiveness
K2_Q02b	Agreeableness - Respectfulness
K2_Q02c	Conscientiousness - Productiveness
K2_Q02d	Emotional Stability - Depression
K2_Q02e	Open-Mindedness - Intellectual Curiosity
K2_Q03a	Extraversion - Energy level
K2_Q03b	Agreeableness - Trust
K2_Q03c	Conscientiousness - Responsibility
K2_Q03d	Emotional Stability - Emotional Volatility
K2_Q03e	Open-Mindedness - Creative imagination
K2_Q04a	Extraversion - Sociability
K2_Q04b	Agreeableness - Compassion
K2_Q04c	Conscientiousness - Organization
K2_Q04d	Emotional Stability - Anxiety
K2_Q04e	Open-Mindedness - Aesthetic Sensitivity
K2_Q05a	Extraversion - Assertiveness
K2_Q05b	Agreeableness - Respectfulness
K2_Q05c	Conscientiousness - Productiveness
K2_Q05d	Emotional Stability - Depression
K2_Q05e	Open-Mindedness - Intellectual Curiosity
K2_Q06a	Extraversion - Energy level
K2_Q06b	Agreeableness - Trust
K2_Q06c	Conscientiousness - Responsibility
K2_Q06d	Emotional Stability - Emotional Volatility
K2_Q06e	Open-Mindedness - Creative Imagination

Annex – List with dropped items from Cycle 1

Module A - General information - Cycle 1

No items dropped.

Module B – Formal and non-formal education - Cycle 1

Note that many of the dropped items in Module B were replaced by similar types of questions, but given the substantial changes in the wording cannot be identified as soft trend.

Dropped	Indicator
B_S01a1	Specify name of foreign education
B_Q01a2	Country name foreign education
B_S01a2	Specify country name foreign education
B_Q01a3	National qualification corresponds with foreign education
B_Q01d	Month completed last qualification
B_D01d	Derived variable: Months elapsed since completing highest level of qualification
B_Q03d	Month stopped studying for uncompleted qualification
B_D03d	Derived variable: Months elapsed since leaving education without completing programme
B_Q04a	Formal qualification in last 12 months
B_Q04b	Number of formal qualifications in last 12 months
B_Q05a	Level of highest/last qualification
B_Q05b	Area of study highest/last qualification
B_Q05c	Reasons to study job related
B_Q10a	Employed in last 12 months while studying
B_Q10b	Study take place during working hours
B_Q10c	Study useful for job or business
B_Q11	Employer paid for studying the qualification
B_R12	Introduction to training questions
B_Q12a	Participate in open or distance education
B_Q12b	Frequency of participating in open or distance education

B_Q12c	Participate in organized sessions for on-the-job training or training by supervisors or co-workers
B_Q12d	Frequency of participating in organized sessions for on-the-job training or training by supervisors or co-workers
B_Q12e	Participate in seminars or workshops
B_Q12f	Frequency of participating in seminars or workshops
B_Q12g	Participate in courses or private lessons
B_Q12h	Frequency of participating in courses or private lessons
B_D12h	Derived variable: one or more learning activities reported
B_R13	Introduction to questions on most recent training
B_Q20b	Time job-related activities

Module C - Current status and Work history - Cycle 1

Dropped	**Indicator**
C_Q02c	Start job within three months or in more than three months
C_Q04a	Job search: get in contact public employment office
C_Q04b	Job search: get in contact private agency
C_Q04c	Job search: apply to employers directly
C_Q04d	Job search: Ask among social network
C_Q04e	Job search: place or answer job advertisements
C_Q04f	Job search: study job advertisements
C_Q04g	Job search: take a recruitment test/examination/undergo interview
C_Q04h	Job search: look for land, premises or equipment
C_Q04i	Job search: apply for permits/licenses or financial resources
C_Q04j	Job search: anything else
C_S04j	Job search: specify anything else

Module D – Current work - Cycle 1

Dropped	**Indicator**
D_Q13a	Learning new work-related things from co-workers or supervisors

Module E – Last job - Cycle 1

Dropped	Indicator
E_Q10	Main reason stopped working in the last job

Module F – Skills used at work - Cycle 1

Dropped	Indicator
F_Q02d	Selling a product or selling a service
F_Q02e	Advising people
F_Q03b	Planning the activities of others
F_Q07a	Skills to cope demanding duties that are required
F_Q07b	Further training to cope

Module G - Skill Use Literacy, Numeracy and ICT at work - Cycle 1

Note that many of the dropped items in Module G were replaced by similar types of questions, but given the substantial changes in the wording cannot be identified as soft trend.

Dropped	Indicator
G_Q01d*	Read articles in professional journals or scholarly publications
G_Q01e*	Read books
G_Q01h	Read diagrams, maps or schematics
G_Q02b*	Write articles for newspapers, magazines or newsletters
G_Q02c*	Write reports
G_Q03b	Calculate prices, costs or budgets
G_Q03c	Use or calculate fractions, decimals or percentages
G_Q03d	Use a calculator - either hand-held or computer based
G_Q03g	Use simple algebra or formulas
G_Q05a**	Use email
G_Q05d	Conduct transactions on the internet
G_Q05e	Use spreadsheet software
G_Q05f	Use a word processor
G_Q05g	Use a programming language to program or write computer code

G_Q05h**	Participate in real-time discussions on the internet
G_Q06	Level of computer use needed to perform job
G_D07a	Derived variable ^HaveHad
G_D07b	Derived variable ^NeedNeeded
G_Q07	Computer skills needed in job
G_Q08	Lack of computer skills

* These items were combined into one variable measuring both aspects

** Aggregated in F2_Q05a

Module H - Skill Use Literacy, Numeracy and ICT in everyday life - Cycle 1

Note that many of the dropped items in Module H were replaced by similar types of questions, but given the substantial changes in the wording cannot be identified as soft trend.

Dropped	**Indicator**
H_Q01d	Read articles in professional journals or scholarly publications
H_Q01h	Read diagrams, maps or schematics
H_Q02b*	Write articles for newspapers, magazines or newsletters
H_Q02c*	Write reports
H_Q03b	Calculate prices, costs or budgets
H_Q03c	Use or calculate fractions, decimals or percentages
H_Q03d	Use a calculator - either hand-held or computer based
H_Q03g	Use simple algebra or formulas
H_Q03h	Use more advanced math or statistics
H_Q05a**	Use email
H_Q05d	Conduct transactions on the internet
H_Q05e	Use spreadsheet software
H_Q05f	Use a word processor
H_Q05g	Use a programming language to program or write computer code
H_Q05h**	Participate in real-time discussions on the internet

* These items were combined into one variable measuring both aspects

** Aggregated in G2_Q05a

Module I: About Yourself – Cycle 1

Dropped	Indicator
I_R01	Introduction
I_Q04b	When I hear or read about new ideas, I try to relate them to real life situations to which they might apply
I_Q04d	I like learning new things
I_Q04h	When I come across something new, I try to relate it to what I already know
I_Q04j	I like to get to the bottom of difficult things
I_Q04l	I like to figure out how different ideas fit together
I_Q04m	If I don't understand something, I look for additional information to make it clearer
I_Q06b	Political efficacy
I_Q07b	Social trust

Module J – Background information – Cycle 1

No items dropped.

References Appendix 3

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