

## PIAAC Conceptual Framework of the Background Questionnaire Main Survey

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# PIAAC Conceptual Framework of the Background Questionnaire Main Survey

## Overview

### Criteria for inclusion of items

For the inclusion of concepts and items in the Background Questionnaire (BQ), we adopted the following criteria:

1. Clearly established relation to skills and other relevant outcomes
2. Good measurement properties in terms of reliability and validity
3. Comparability across groups and across countries
4. Minimum use of national adaptations of questions
5. Comparability with other international surveys
6. Minimum use of developing items for small subgroups

### The policy questions

The PIAAC project seeks to answer the following policy questions:

1. *How are skills distributed?* A comparison of skill levels, skill requirements, investments in education and training across countries, investment mismatches across countries, as well as of investments and mismatches within countries, across demographic categories, regions, sectors of industry, levels and fields of schooling.
2. *Why are skills important?* The relation of skills to relevant labour market outcomes such as employment opportunities, earnings, job security, and skill utilisation, as well as to other outcomes such as health, civic engagement, and social trust.
3. *What factors are related to skill acquisition and decline?* The relation between various learning activities – education, training, informal learning activities – and skill acquisition. The relation of experiences at work, in education and everyday life to skill decline among older individuals.

## Theoretical background

### ***What are key skills?***

#### *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 monitoring, and if necessary investing in, education and training as a way of improving the existing stock of skills. A major project in the quest to identify the key competencies needed for successful functioning was the DeSeCo (Definition and Selection of Competencies) project, which was initiated by the Organisation for Economic Co-operation and Development (OECD) to provide an overarching framework for international skills 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 non-cognitive aspects)” (Rychen & Salganik, 2003, p. 43). The theoretical framework provided by the DeSeCo project indicates the main underlying competencies that give skills their significance but does not in itself directly give rise to clear recommendations as to the skills to be measured. Binkley et al. (2003) developed a framework that provides more detailed guidance for the development of skills measurements.

This work concentrated on two strands of research: the skills necessary in the workplace, and cognitive functioning. The choice of direct assessments in the Adult Literacy and Lifeskills (ALL) survey was based partly 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. As a consequence, ALL concentrated on literacy and numeracy skills, which correspond mainly with generic aspects of the communication and mathematical skill areas identified in workplace research. PIAAC builds on the direct assessments in ALL, extending these to the area of problem solving in technology-rich environments, which contains elements of the problem solving and technology skill areas. Other skill areas, particularly those involving intrapersonal and interpersonal skills, and specific professional skills, are not included in the direct assessment, but the BQ does contain several indicators related to skill use or skill requirements in these areas.

#### *Skill Use: The Job Requirements Approach (JRA) Module*

The main arguments for developing a separate JRA module for PIAAC were the following:

- To provide a cost-effective way of assessing the relevance of skills not covered by the direct assessments.
- To provide some information on the demand side for skills; to supplement the information provided by the direct assessments on the supply side.

Items are now included for the three central domains covered by the direct assessments (literacy, numeracy and Information and Computer Technology (ICT), as well as the areas of problem solving and a range of interaction/social skills (influence, managerial skills, communication skills) and physical skills (strength and manual skill). Besides skill use in these domains, items are included that indicate the level of computer skills required in the respondent's job. Employing the skill use items in the domains that are also being directly tested will make it possible to generate indicators of skills mismatch.

#### *Current investments in education and training*

Access to lifelong learning by different groups remains a crucial issue for governments of the OECD member countries. Formal education, formal training, and informal training all contribute to the stock of human capital, and countries will display different profiles in how the human capital stock is built up. PIAAC will provide a snapshot of human capital investments by the incidence and intensity of 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 adult education and training, to have information on how much of this training is taking place for work-related reasons, and on who is financing such investments. Because most training received by individuals at work also benefits other employers, there is some concern that this will result in underinvestment. The BQ contains some indicators of these aspects.

#### *Reporting categories*

In order to effectively address skill deficiencies while keeping in mind the perspective of the view of social equity, it is important to have a good picture of where the deficiencies are concentrated most strongly. To answer these questions, we need to know how skills are distributed among relevant subgroups, as defined, for example, by gender, age, socioeconomic background, migration status, region, occupation, sector of industry, firm size, and level of education. The BQ contains indicators for each of these reporting categories.

## ***Factors related to skills acquisition and decline<sup>1</sup>***

### *Education as an investment*

In economics, education and learning is treated as an investment. Not everybody is equally likely to invest in the same amount of education. In the first place, people differ in their capacity to acquire skills. Secondly, people differ in preferences. Third, people might face constraints in their choices. Finally, the decision to invest in education will depend on information available at the time of investment. Although the questionnaire contains no direct indicators of innate learning abilities, the family background in terms of parents' education can be used as a control variable for this. Learning strategies may affect individuals' ability to learn. Constraints are expected to differ systematically by different social categories, such as gender, socioeconomic status, and ethnic status. Part of these differences relates to differences in school performance and learning abilities, and part to different choices made in education.

Among the characteristics of one's educational career, the achieved level of education is the most important concept affecting skills levels. Moreover, the particular field of education followed is also expected to affect skills levels. In addition to obtaining data on these aspects, the BQ will allow us to identify whether the education of immigrants has been taken outside the host country.

### *Training and informal learning*

People do not only learn during initial education but also later in life. Several studies have found high returns on workers' participation in training, but others have questioned whether it formal training is what really makes the difference. Employees spend much more time on informal learning activities than on formal learning, and the activities are often interrelated. It is important that PIAAC not only look at the incidence of formal training but also various kinds of informal learning as these also contribute to skill acquisition. The BQ has several items indicating these different kinds of learning activities.

Regardless of the specifics of the training and learning practices applied in the organisation where individuals work, the amount of work experience acquired can be expected to have a strong effect on skills development. However, one is likely to be most exposed to situations to learn something new early in one's career. As the career develops, the chance that one will be exposed to new stimuli is decreased, a pattern that is reinforced by typical patterns of brain development over the life cycle. In addition to total work experience, the number of changes of employer and/or career breaks is therefore also important.

There are also factors outside the world of work that can affect development and retention of competences. The questionnaire therefore covers some activities in which respondents may be involved in in everyday life from which they can learn as well as the above-mentioned work-related factors.

### *Skill loss*

The single most important finding of the International Adult Literacy Survey (IALS) and ALL was that skill loss was sufficient to offset all expected gains from increasing educational quality and quantity. Higher order brain functions follow a steep developmental pattern and reach a plateau of optimal functioning in young adulthood. Most cognitive abilities tend to decline with advancing age. Large individual differences exist in the onset and rate of decline of specific cognitive functions. Fluid abilities (functions that involve controlled and effortful processing of novel information) typically start declining in the mid-20s while crystallised skills

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<sup>1</sup> Although the cross-sectional nature of the PIAAC survey makes it impossible to infer strict causality in any observed relationships between variables, the research literature on skill acquisition and decline is strongly based on the notion of causality. It should be stressed that any implicit or explicit references to causality in the ensuing discussion pertain to this literature, and do not imply any claim with regard to the potential use of the PIAAC data.

(the representation of learned skills and access to knowledge) may improve until and beyond even the age of 70. One may hypothesise that numeracy and literacy skills relate more strongly to crystallised abilities, and therefore are less susceptible to decline, than dynamic problem solving in a technology-rich environment, which relates more to fluid abilities.

Building partly on insights from cognitive and neuropsychology, De Grip and Van Loo (2002) developed a typology of different types of skills obsolescence, of which wear – which results from the natural ageing process and may be accelerated by physically or mentally challenging working conditions – and atrophy – which is due to the lack or insufficient use of skills and may be brought on by unemployment, career interruptions or working below one's level of education – are particularly relevant from the point of view of PIAAC. The BQ contains indicators that are thought to be related to wear (age, health) and atrophy (unemployment, working below one's level, tenure, and sector of industry). In addition, several of the abovementioned indicators of workplace learning have a direct bearing on not only on-the-job learning, but also the risk of skills obsolescence in the form of atrophy.

### **Skills and Outcomes**

#### *Skills and labour market outcomes*

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). Key indicators in this respect that are included in the BQ are current labour status (employed, unemployed, inactive), self-declared main status (allowing a better understanding of the situation of those not in the labour force), 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 is the precise role of education and skills in producing these outcomes. There are rivaling hypotheses on this point. The human capital theory (Becker, 1964) claims that people with more years of schooling earn more because they are more productive. Scholars such as Spence (1973) and Arrow (1973) have pointed out that rewards are often based on signals such as formal qualifications as well as on the basis of productivity. The labour queue theory (Throw, 1975) points out that many relevant competencies are learned on the job rather than in education. Credentialists such as Collins (1979) claim that higher education does not lead to superior competencies at all, but is used by “gatekeepers” to legitimise the rationing of access to high-status, highly paid jobs. There is probably an element of truth in all these theories; the crucial point is to specify the contexts under which one or the other mechanism prevails. In a study like PIAAC, we might expect large differences among the countries and among sectors of industry in the extent to which skills affect labour market outcomes relative to the effects of educational credentials.

#### *Skills and other outcomes*

There is good empirical evidence that education not only affects labour market outcomes but is also a strong predictor of outcomes in other life domains. The BQ includes indicators of family formation, health, voluntary work and social trust. Education not only affects the individual outcomes in these domains but also social returns as well due to spillover effects. As with the effects of education on labour market outcomes, the effects of education on other outcomes are still not completely understood. Broadly, two mechanisms can be distinguished: an effect on skills – education directly affects knowledge and skills that are relevant for healthy behaviour, civic engagement etc. – and an effect on allocation – higher education increases the chance of ending up in healthier jobs or in social networks in which civic engagement is higher. The PIAAC data should provide clues as to the extent to which mechanism is dominant, and as to how this varies both between and within countries.

# 1. Criteria for inclusion of items

For the inclusion of concepts and items in the BQ, we will adopt the following list of criteria:

1. The concepts should have a clearly established relation in the theoretical and empirical literature to skills and other relevant outcomes
2. Items must have good measurement properties in terms of reliability and validity and be able to maintain that over time
3. Items must be comparable across groups and across countries. This poses limits to items that are vulnerable to cultural bias
4. Ex-ante harmonisation is preferred over ex-post harmonisation. National adaptations of questions (other than translation issues) should be minimised and only allowed in cases where it is functional (e.g., in asking about type of education, etc.)
5. If possible, items must be comparable with other international surveys. Most important is the comparability to IALS and ALL, but other international surveys such as the Labour Force Survey (LFS), World Value Survey (WVS), the European Social Survey (ESS) constitute important markers as well
6. In general we recommend that most questions should be asked to everybody, or at least to a majority of the respondents. Developing items for small subgroups should be minimised

## 2. The policy questions

The PIAAC project seeks to answer the following policy questions:

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

### 2.1. How are skills distributed?

Human capital is considered the driving force of economic growth. Investments in skills are vital to keep up with technological change (the so-called Skill-Biased Technological Change) but also with other changes as a result of market developments or organisational developments (e.g., the introduction of High Performance Workplace Practices). Policymakers have an interest in monitoring the stock of human capital in their country and in identifying the different levels among relevant subgroups. PIAAC will assess the stock of human capital in a society by providing a descriptive analysis of the distribution of skills proficiencies and skills use in the adult population. The survey will enable countries to answer questions like:

- How does the adult population in a country compare to other countries in terms of average levels of skills proficiency and skill use? What share of the adult population has low proficiencies of relevant skills?
- In terms of equity, how are skills distributed among relevant subgroups, such as gender, age group, region or migration status? Are certain subgroups particularly vulnerable to low skills proficiencies?
- How are skills proficiencies distributed across sectors of industry? Are there certain sectors of industry that are characterised by particularly low levels of skills proficiency? How do the skills levels of these sectors compare to those in other countries?
- How are skills proficiencies distributed across different levels of schooling when benchmarked against other countries? Are there population subgroups that appear to be underserved by the current education system? Is there an underdevelopment

of skills at particular levels of education? What are the skills levels of early leavers from education?

- Who is participating in adult learning of various types? To what extent are particular population subgroups excluded from adult learning systems?

## 2.2. 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 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. For that reason, one of the key goals of the BQ is to provide indicators that can be used to show if differences in skill matter economically and socially. The most obvious area in which policymakers are interested is how skills levels are related to economic outcomes of individuals. Cognitive skills are thought to be 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 indeed associated with better labour market outcomes. Relevant questions are:

- How are skills related to individual employment opportunities and job security?
- How are skills related to earnings and other indicators of labour market success?
- Do low skill proficiencies form a barrier to individuals entering the labour force?
- Are low-skilled people more affected by job insecurity? Is there a minimum level of skills that is needed to be employable?
- How do skills affect the relation between education and training on the one hand and economic outcomes on the other? Can skills compensate for low educational qualifications?

Apart from economic outcomes, other areas are of interest as well, such as the relation among skills, health status and civic participation. Adverse outcomes in such areas place large burdens on governments, 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).

Relevant questions are:

- To what extent is literacy related to health status of individuals, to that of various subgroups, and the overall population?
- To what extent do individuals with low skills appear to be less engaged in the broader society (voluntary work, social trust)?
- How do individuals with low skill levels cope with their everyday reading and numeracy demands? To what extent do these coping mechanisms make these individuals reliant on others? To what extent does the engagement of migration groups or linguistic minorities appear to be inhibited by their lack of skill in the language of the test?
- Do high-skilled people have a higher involvement in civic activities? What is the relation between skills and the level of social trust?



### 2.3. What factors are related to skill acquisition and decline?

Under the assumption that skills matter economically and socially, policymakers have an interest in knowing what factors are related to higher skill levels. Of course, the prime focus of interest is to assess the effects of factors that are directly affected by policy, such as the provision of formal and nonformal organised learning activities like education and training. But it is also relevant to compare the efficiency of these skills production routes with the efficiency of other routes not directly under the control of policymakers, such as the informal learning activities in which people can engage. Assessing the overall relation among education and training and skill levels is only a first step in unravelling the determinants of skills acquisition. We can assume that not all education and training activities have the same impact on skills development. Nor can we assume that the impact is the same for all relevant subgroups. Policymakers have an interest in seeing which characteristics of education and training are most strongly related to higher skill levels in the population and which subgroups appear to profit most from which type of intervention. Finally, we need to be aware that skills can be acquired, but also can also be lost. Preventing skill decline is probably just as important as promoting skill acquisition, but the underlying factors affecting these processes may be quite different and it is important to have good insight in both processes.

This means that the survey needs to enable countries to answer questions like:

- What is the relation between education and training and the skill development of people? Are these relations different from those with other learning activities people engage in to develop their skills, such as informal on-the-job learning?
- Are the effects of education and training the same for each subgroup? Are there subgroups that appear to profit more or less from the investment in education and training?
- What is the relation between underinvestment in work-related training and adult skill levels? How are characteristics of the work environment related to skill levels? Is informal learning on-the-job a substitute for work-related training?
- How do processes of skills acquisition and skills decline vary with age? What are the factors that are related to skill decline? Are these the same as the factors that are related to skill acquisition?

## 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 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, in Section 3.1, with a brief overview of the literature on the nature 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 proceed with a solid understanding of what is being measured in the DA and, equally important, what is not being measured. Following this, in Section 3.2, we summarise the literature pertaining skills

acquisition and decline.<sup>2</sup> The theoretical discussion is concluded in Section 3.3 with a review of the literature on outcomes of skills.

### **3.1. What are key skills?**

As was remarked in Section 2.1, 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, ethnicity, region, 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. Below is 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 ALL and the Programme for International Student Assessment (PISA).

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 skills 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 noncognitive 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 the competencies to 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.

Binkley et al. (2003) developed a framework that provides more detailed guidance for the development of skills measurements. This work concentrated on two strands of research: what skills are necessary in the workplace, and cognitive functioning. From the first strand, a

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<sup>2</sup> The reason for discussing factors affecting skill development before effects of skills on outcomes, rather than the other way around as in Section 2, is that the discussion of effects of skills on outcomes presupposes that we already have a good idea what causes skills.

list of six skill areas was extracted that seemed to underlie many of the most important skills: communication (speaking, listening, reading, and writing), mathematical, problem solving, intrapersonal (motivation, metacognition), interpersonal (teamwork, leadership) and technology. From the strand of psychological theory, four core domains of intelligence were extracted: practical abilities, crystallised analytical abilities, fluid analytical abilities, and creative abilities (the ability to cope with novelty). As the authors point out, the two strands are not mutually exclusive, but rather represent different aspects of skill. The workplace skills provide the context within which each of the four core intelligence domains are expressed; conversely, each category of workplace skill can involve four distinct types of thinking.

The choice of direct assessments in ALL was based not only on these theoretical notions but practical considerations such as an established tradition of measurement, sufficiently compact to be used in a household survey. As a consequence, ALL concentrated on only part of the matrix formed by the intersection of the two strands of research, in particular on the more generic aspects of the communication and mathematical skill areas. PIAAC builds on the direct assessments in ALL, extending these to the area of problem solving in technology-rich environments, which contains elements of the problem solving and technology skill areas. Although it is not possible to draw any sharp dividing line, the three domains of direct assessments in PIAAC will differ in the extent to which they relate to the four types of thinking derived from psychological theory. Since the developmental pattern throughout life is thought to be quite different for the different types of thinking, this has important implications for the manner in which the different skills can typically be expected to be acquired and in some cases eventually lost. We will return to this point in Section 3.2.

To the extent that the skills measured in the direct assessments are shown to be related to important economic and social outcomes (see Section 3.3), the pragmatic restriction to those skill aspects that lend themselves well to a survey approach need not seriously 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. The intrapersonal and interpersonal skill areas are not included in the direct assessment, 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 specific skills used by individuals in their chosen line of work.

### ***The importance of professional expertise***

Despite the fact that employers often list generic cognitive skills and personal traits skills as the most important skills required in the workplace, professional expertise is a condition *sine qua non* for success in many occupations. 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. The German psychologist Weinert formulated this as follows: “Over the last decades, the cognitive sciences have convincingly demonstrated that context-specific skills and knowledge play a crucial role in solving difficult tasks. Generally, key competencies cannot adequately compensate for a lack of content-specific competencies” (Weinert, 2001: 53).

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, based on the answers to questions D1a and D1b in the BQ. Since the differences among occupations in the skills measured in the direct assessments is 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 direct assessment and in the area of Interpersonal skills, have been developed in a separate module based on the Job Requirements Approach (JRA).

### ***Skill Use: The Job Requirements Module***

In 2004 the OECD launched an initiative to develop a module in PIAAC on generic work skills requirements as a complement to the direct assessments. This was called the Job Requirements Approach (JRA). In the JRA, workers are asked to indicate the level of skills that is required in their current work in several skill domains. The method of JRA has been successfully applied in different surveys, such as the British Skills Survey, similar surveys in Italy and Spain, the US O\*NET survey and several international graduate surveys (CHEERS and REFLEX).

The main arguments for developing a separate JRA module for PIAAC were the following:

- The direct assessments in PIAAC are limited to relatively few, albeit crucial, skill domains. Yet there was a widespread feeling, supported by some case studies, that other skills were becoming increasingly relevant in modern workplaces. Important examples were communication skills and the skills needed to work within teams, to work at multiple and flexible tasks, and to work more independently. There was 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 and Green, 2004). It was intended that the JRA module would provide a cost-effective way of assessing the relevance of these skills.
- Earlier skills surveys like 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. 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.

In the JRA module, respondents will be asked questions about the skills that they use at work. First, the module will generate many items describing the generic activities involved in doing the job. The choice of items is informed by theories of skill and the practices of commercial occupational psychology. To reduce the multiple items to a smaller and theoretically meaningful set of generic skills, statistical techniques are used to generate several generic skill indicators from the responses on these items.

In the course of development of the BQ, it became apparent that parts of the JRA module corresponded to a large degree to measures of skill use that are required for analysing the results of the direct assessment. The subject matter expert groups (SMEGs) in the areas of literacy, numeracy and ICT have developed scales that integrated the experiences from ALL with the newly developed insights from JRA. Scales were developed that measure the use of skills both at work and in everyday life (including study) in a similar way. These scales are broadly comparable to what has been measured in ALL, but the scales have been adjusted such that they will have better psychometric properties. Items are now included for the three central domains covered by the direct assessments (literacy (reading: G\_Q01a-h, H\_Q01a-h; writing: G\_Q02a-d, H\_Q02a-d), numeracy (G\_Q03a-h, H\_Q03a-h) and ICT (G\_Q04, G\_Q05a-h, G\_Q06-8, H\_Q04,a-b, H\_Q05a-h,).

In addition to these three central domains covered by the direct assessments, the JRA module contains items pertaining to problem-solving (F\_Q05a-b) as well as a range of interaction/social skills: cooperation (F\_Q01b), influence (F\_Q04a-b), managerial skills (F\_Q03b), self-direction (F\_Q03a, c), horizontal interaction (F\_Q02a-c) and client interaction (F2d-e), and physical skills (stamina (F\_Q06b) and manual skill (F\_Q06c).

Two assumptions underpin the use of the job requirements approach. First, it is assumed that the individual is a well-informed person to report about the activities involved in the job he or she is doing. All jobs differ, even within quite narrowly categorised occupations, and one

would normally expect the job-holder to know best. Nevertheless, this might not always be true, and where the job-holder has only been in a post for a short time, the assumption might be questioned. In the case of out-of-work respondents, the field trial has tested the reliability of respondents' ability to recall the activities of their most recent job in the previous 12 months. No indications were found that there was a serious recall bias. Second, it is assumed that the individual reports these activities in an unbiased way. This assumption might also be questioned: Individuals might talk up their jobs to boost their self-esteem. However, it is held that they are less likely to do so when reporting their activities than reporting how good they are in the performance of these activities. To minimise bias, the general principle is to ask respondents to report actual behaviour, such as frequency of use and proportion of time spent on using different skills, rather than often-used alternatives such as the importance of these skills for the job.

The measures of "job skill" obtained through the JRA module 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 a general subjective question on self-perceived skill underutilisation (F\_Q07a). In several domains, however, there will be no specific mismatch indicator available: The only indicator of skill in these domains will be the use of the skills in the job.

### ***Current investments in education and training***

From a descriptive point of view, it is important that PIAAC provides accurate information on current levels of education and training. Access to lifelong learning by different groups remains a crucial issue for governments of the OECD member countries. Formal education (B\_Q01-B\_Q10), formal training (B\_Q12-B\_Q20), and informal training (D\_Q13a-c) all contribute to the stock of human capital, and countries will display different profiles in how the human capital stock is built up. PIAAC will provide a snapshot of human capital investments by the incidence and intensity of 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 adult education and training, to have information on financing of such investments. A large part of the adult 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 learning 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 (B\_Q15b, 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 (B\_Q16, 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 preferred to engage (B\_Q26a-b).

When analysing training, it is necessary to be able to distinguish different categories of training. At the most general level, it is important to distinguish work-related from non-work-related training (B\_Q14a). Work-related training is usually expected to have some effect on performance, which is presumably expected to be based on increased skill levels, and to result in productivity and possibly wage gains. Training that has been undertaken for other

reasons may also increase certain skills but would not necessarily lead to productivity increases at work.

### ***Reporting categories***

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, for example, by gender (A\_N01a), age (A\_Q01a), socioeconomic background (J\_Q06b, J\_Q07b) or migration status (J\_Q04, J\_Q06a, J\_Q07a). 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.

Region (to be delivered from the Case Management system) is an important reporting category as well because of strong regional differences in level of economic development in some countries. It may be that certain regions are being held back by particularly low levels of skills proficiency, or conversely, that regions can be identified where skill demand is particularly low. In addition, because policy is often formulated and/or implemented at the regional level, it is crucial to have access to outcomes at that level. Occupation (D\_Q01, E\_Q01), sector of industry (D\_Q02, E\_Q02) and firm size (D\_Q06, E\_Q06) are needed to detect 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 (B\_Q01) 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.

### **3.2. Determinants of skills acquisition and decline**

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 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. A second major strand is that of sociological research that points to the social environment affecting school choice and educational attainment. The third strand is educational research, in which scholars have tried to uncover those features of education that are particularly effective in promoting learning. 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, but in recent years the focus has increasingly broadened to include features of the job or organisation that promote informal learning. 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. In this section we will look at each of these strands of research in turn.

### ***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. The capacity to learn depends not only on innate cognitive abilities but also on personal traits. For example, someone who is easily distracted from a task will need more time to learn. 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. Finally, the decision to invest in education will depend on information available at the time of investment. 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 (J\_Q06b and J\_Q07b). Learning strategies (I\_Q04) are included as they may affect individuals' ability to learn.

### ***The social environment***

The 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. 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 occupational careers and later access to training. The sex of the respondent is therefore a key reporting category for PIAAC. Inequality in access to education related to the family background both in terms of socioeconomic status and migration status is more persistent. Part of these differences relate to differences in school performance and learning abilities, the so-called primary effects of social stratification (Boudon, 1974). These may be caused both by differences in innate abilities as well as differences in socialisation processes. The cultural capital of the family (Bourdieu, 1984) in particular provides a powerful predictor of the school performance. But even with the same school performance, students from different family backgrounds make systematically different choices in education (the secondary effects of social stratification) 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. 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 benefits may be lower. The BQ includes indicators of gender (A\_N01), parents' education (J\_Q06b, J\_Q07b), migration status (J\_Q04a-c, J\_Q06a, J\_Q07a), cultural capital in parental home (J\_Q08) and language used in parental and current home (J\_Q05a1-2, J\_Q05b).

### ***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 for life. 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 these 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.

Although it is not practicable to describe the educational environments respondents have been exposed to, it does make sense to include indicators of respondents’ learning strategies, which may in part be a result of such exposure. As Peschar (2003) has remarked, such strategies can be seen as important prerequisites for learning throughout one’s life. Self-regulated learning theories point to the relevance of metacognitive abilities and information-processing strategies of students (Kolb, 1984). Learning styles differ among students, ranging from a memorising and rather atomistic ways of learning towards a more constructivist approach in which concepts and theories are actively incorporated in a coherent body of knowledge. Although such attitudes are likely to be heavily influenced by one’s family background, either directly through genes or indirectly through early socialisation, there is evidence that such attitudes and strategies can be influenced by education. Question I\_Q04a-m contains indicators of learning strategies. Although the list of items has been strongly based on previous international comparative research, the question in its current form is new.

Among the characteristics of the educational career, the achieved level of education (B\_Q01a) is, of course, the most important concept affecting skills levels. More years of schooling are expected to have a positive impact on the skills proficiencies. Moreover, the particular field of education (B\_Q01b) followed will also affect skills 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.

Other relevant characteristics of the educational career that may affect the skills development are the type of pathway in secondary education (whether a general or school-based vocational (B\_Q01a)). 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.



## ***Training and informal learning***

People do not only learn during initial education but later in life as well. In the human capital literature, many studies have analysed the effects of workplace training participation on workers' wages (see Bassanini, Booth, Brunello, De Paola, & Leuven, (2005) for an overview). Several studies have found high returns on workers' participation in training. Brunello (2004) found that having recently attended training increases a worker's income by about 12 percent.

However, one may wonder whether it is really the participation in formal training that makes the difference. Borghans, Golsteyn and De Grip (2006) show that employees spend much more time on informal learning activities than on formal learning. They also found that when employers stimulate workers' participation in formal courses, these workers will also spend more time on informal learning in the workplace. As many of the studies on the effect of formal training do not measure the time spent on informal learning, all the benefits of the knowledge and skill acquisition of the workers are attributed to their participation in formal training. It is important that PIAAC not only looks at the incidence of formal training but also explores various kinds of informal learning, as these contribute highly to skills acquisition.

Arrow (1962) emphasised the importance of unstructured workplace learning, not from the perspective of the individual worker but that of the firm. He found that informal learning is a more or less automatic byproduct of the regular production process of a firm, which he labeled "learning by doing." Furthermore, job characteristics might also affect post-initial schooling. Employees with mainly monotonous tasks are expected to attend less formal training than those in jobs with more complex tasks. Jobs that require problem solving and learning new things probably include high training incidence and informal learning as well.

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 behaviour, 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 and level of schooling are found to be important determinants of post-initial schooling behaviour (Bassanini et al, 2005).

In addition to measures of participation in education at the time of the survey and over one's lifetime (B\_Q01 to B\_Q10), the BQ contains questions on recent investments in training (B\_Q12 to B\_Q20, including the main reason for participating in training (B\_Q14b, crucial for analysing the effects of training)), informal training by supervisors, colleagues, etc. (D\_Q13a), learning by doing (D\_Q13b), keeping up to date with new products or services (D\_Q13c) and work autonomy (D\_Q11a-d).

Regardless of the specifics of the training and learning practices applied in the organisation in which individuals work, the amount of work experience acquired can be expected to have a strong effect on skills development. In wage estimations, work experience is generally assumed to be positively related to productivity, but the returns are assumed to diminish with further experience. In terms of skill acquisition, this is consistent with the notion that one is likely to be most exposed to situations from which one can learn something new early in one's career. As the career develops, the chance that one will be exposed to new stimuli is decreased. This pattern is likely to be reinforced by typical patterns of brain development over the lifecycle, which predicts a steady decline in learning and retention abilities from young adulthood onward. We will return to this point below.

Skill acquisition is not only dependent on total 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,

see below). 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. Question C\_Q09 allows us to establish the total number of years of work experience (if any) the respondent has acquired in his or her lifetime. Question C\_Q10a provides information on the number of different employers worked for in the last five years.

### ***Skill loss***

The increased focus on lifelong learning 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. The single most 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 nonoptimal 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.

From a cognitive and neuropsychological perspective, higher order brain functions follow a steep developmental pattern and reach a plateau of optimal functioning in young adulthood. Such processes and changes therein can be measured on a behavioural level using dedicated neurocognitive instruments which tap the efficiency within specific neuropsychological domains, such as language, intelligence, memory, attention and speed of information processing.

Optimal neurocognitive development is dependent on a complex interplay of factors, with genetics, socioeconomic status, educational achievement, adequate nutrition, and uncompromised mental and physical health being the strongest predictors of developmental success. Researchers have coined the term “brain reserve capacity” (or BRC) to indicate the neurobiological constraints which determine maximum processing capacity of higher order brain functions. This concept has proven its validity, in, for example, predicting individual cognitive ageing trajectories later in life. Important proxy measures of BRC include educational level and occupational achievement.

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. In Section 3.1 we drew attention to the theoretical distinction drawn in psychological research between “fluid” and “crystallised” abilities. 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 (Figure 1) 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 dynamic problem solving in a technology-rich environment 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.

**Figure 1: Theoretical representation of “crystallised” and “fluid” abilities over the life span**

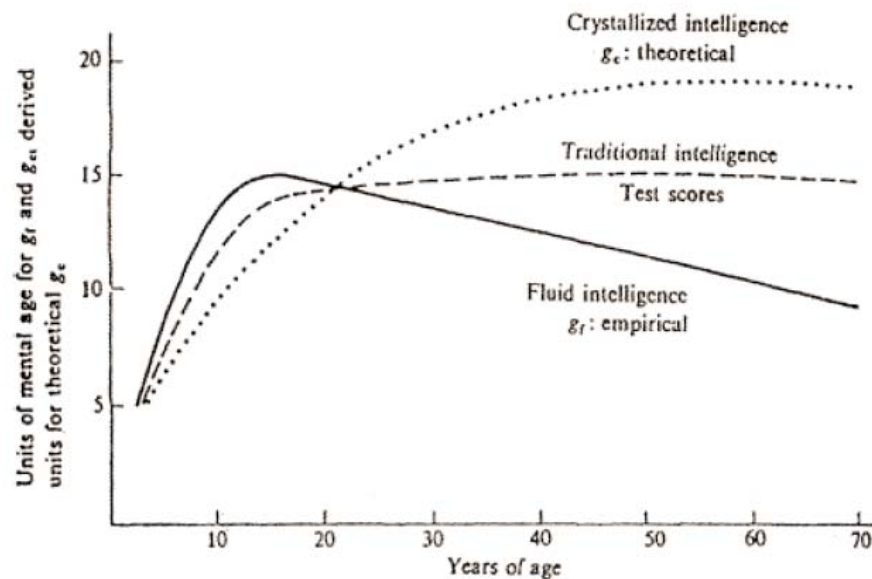


Figure 1. A theoretical description of life span curves of intellectual abilities. From *Intelligence: Its structure, growth and action* (p. 206) by R. B. Cattell, 1987, Amsterdam: North-Holland. Copyright 1987 by Elsevier Science Publishers. Reprinted with permission.

The two most prominent symptoms of “usual” cognitive ageing in daily life are a gradual reduction in memory retrieval and information processing speed. Stored information remains relatively intact, but access and retrieval becomes increasingly difficult for older individuals. Another feature that has received considerable interest in research is the reduced ability of older individuals to suppress or inhibit irrelevant information, making decision processes more complicated, and therefore slower.

Still, cognitive ageing is not merely a predestined process which ultimately leads to pathological states, such as a cognitive disorder like dementia. The ability to learn new skills is still present in older individuals, but – on average – more time is needed to develop the same level of mastery as for younger persons. 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).

Empirical findings suggest that complex intellectual activity increases cognition of older workers (Schooler et al., 1999). Skill investments made during working life might improve people’s capacity to continue learning and adapting to new environments. Other factors that

are conjectured to affect the development of cognitive ability at later stages in life include occupation, leisure activities, lifestyle, and social interaction.

Building partly on such insights from cognitive and neuropsychology, De Grip and Van Loo (2002) developed a typology of different types of skills obsolescence. Firstly, the depreciation of human capital may simply be caused by the wear of skills, resulting from the natural ageing process. Physically or mentally challenging working conditions may accelerate the wear of a worker's skills. Large epidemiological studies have shown that health-related factors are involved in the enhanced cognitive decline seen with increasing age. In addition, several chronic diseases have been associated with a reduced cognitive capacity in both epidemiological surveys and clinical case-controlled studies.

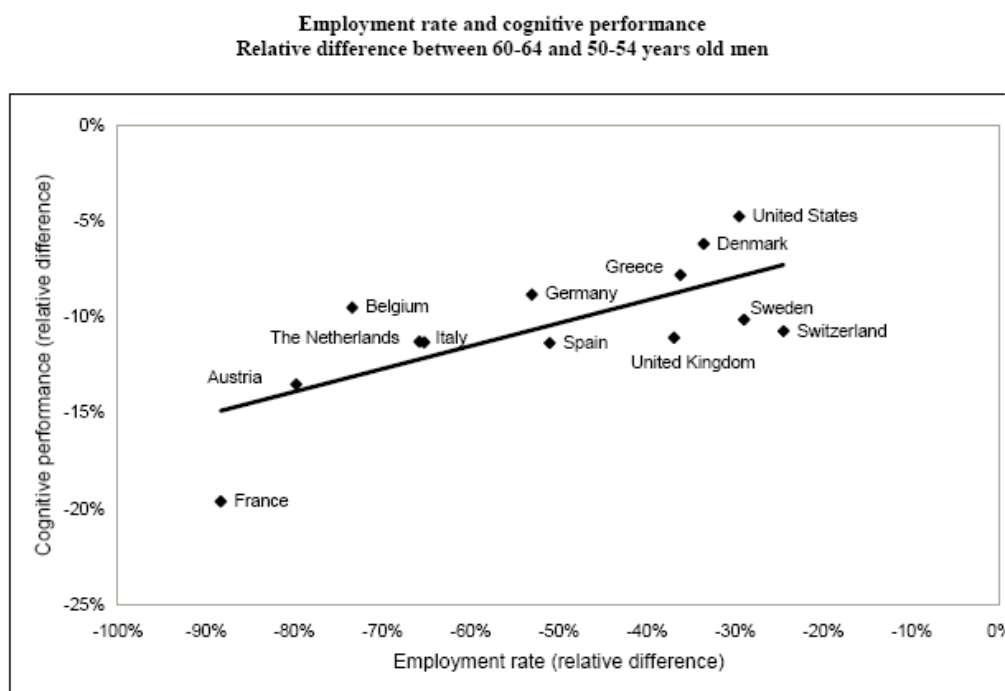
The second category of technical skills obsolescence concerns the atrophy of skills due to the lack or insufficient use of them. This atrophy could result from unemployment and career interruptions, or from employees working below their attained level of education. Arthur et al. (1998) conclude, on the 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. Apart from these two factors related to the personal characteristics of the worker, skills obsolescence may also occur as a result of changes in the demand for skills, due to, e.g., technological or organisational developments in the production process.

The BQ should enable insight as to some of the possible causes of skills obsolescence, such as age (A\_Q01a-b), health (I\_Q08), unemployment (C\_D05), working below one's level (D\_Q12a-ca-b), long tenure (D\_Q5a1-2) and sector of industry (D\_Q02a-b).

### ***Institutional factors***

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. Using data from the Survey on Health, Ageing and Retirement on cognitive skills of the population aged 50 and over, Adam et al. (2007) show that relative average cognitive skills among older workers are on average higher in countries in which – as a consequence of national institutions – participation rates of older workers are also higher (see Figure 2).

**Figure 2: Employment Rate and Cognitive Performance**



Source: S. Adam, E. Bonsang, S. Germain and S. Perelman (2007), "Retirement and cognitive reserve: A stochastic frontier approach applied to survey data," CREPP DP 2007/04, University of Liège.

Despite the fact that it is extremely important to better understand how the process of cognitive decline can be stopped and whether there is scope and need for policy intervention, the study of the determinants of cognitive decline is still in its infancy. Much can be learned from relating differences across countries to cross-country differences in policies, regulations and institutions. PIAAC offers a unique opportunity to gain such insights as it will provide detailed data of the distribution of skills across age. By linking this type of data to information from other data sources on institutional factors, we can at least explore how these relations look at the aggregate level of countries.

Appendix 1 shows the main elements that are thought to influence skill acquisition and decline.

### 3.3. Skills and Outcomes

In Section 2.3 we remarked that the policy relevance of measuring skills is strongly dependent on their effect on 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 in other areas that may also be influenced by skills, such as health status, voluntary work, and social trust.

#### **Skills and 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 most basic of economic outcomes is an individual's current labour status, which is constructed using several questions in the questionnaire (C\_D05). A distinction can be drawn between those who participate in the labour force and those who do not. The former category can be divided in turn into those who

are employed and those who are unemployed (that is currently not working but available for and actively seeking work). There are several reasons why an individual might fall into the latter category – for example study, household duties, or sickness or disability. To provide a broader indication of respondents' current situation, in question C\_Q07 respondents are asked to report their own self-declared main status.

For those currently or recently in work, several important labour market outcomes are included in the questionnaire, including working hours (D\_Q10), individual earnings (D\_Q16-18), job security (D\_Q09), occupational status (D\_Q01a-b), and the quality of the match between education and work (D\_Q12a-c)

One of the interesting questions in this respect regards the precise role of education and skills in producing these outcomes. There are rivaling 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. The mechanisms are likely to differ according to the kind of job or position, labour market segment (private/public, economic sector), and country. In a study like PIAAC, we might expect large differences between the countries in the extent to which skills affect labour market outcomes relative to the effects of educational credentials. There is strong evidence that in countries characterised by a high degree of selectivity, stratification, and standardisation, employers are more likely to select and reward employees on the basis of formal educational qualifications than in countries where education is less regulated (Müller & Shavit, 1998).

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?). 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 the number of additional years of schooling that did not result in a diploma (which can be calculated as the difference between the year in which one last left education without completion (B\_Q03c) and the year in which one last successfully completed formal education (B\_Q01c). This schooling should lead to additional skills, and if the human capital theory is correct, to better outcomes.

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 the number and intensity of received training is not only relevant in predicting skills, but also in predicting economic outcomes. 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 (D\_Q06a-b) 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 factors relating to household composition (J\_Q01), family formation, as indicated by marital/cohabitant status (J\_Q02a), and number and age range of children (J\_Q03a-d), and job characteristics such as employee/self-employed status (D\_Q04), supervisory status (D\_Q08a-b) and job tenure (D\_Q05a).

### ***Skills and other outcomes***

There is good empirical evidence that education not only affects labour market outcomes but is also a strong predictor of outcomes in other life domains. The BQ includes indicators of family formation (J\_Q02a, J\_Q03a-d), health (I\_Q08), voluntary work (I\_Q05f), political efficacy (I\_Q06a) and social trust (IQ07a-b). Education not only affects the individual outcomes in these domains but also affects social returns as a result of spillover effects. This is one of the reasons why policymakers are so interested in understanding these broader effects of education, because the social returns in terms of decreased costs for health and crime may well overwhelm the individual economic returns. The OECD recently published a report on the social outcomes of learning (Schuller and Desjardin, 2007), underpinning this need for investment in education to increase health and civic and social engagement.

As with the effects of education on labour market outcomes, the effects of education on other outcomes are still not completely understood. Broadly, two mechanisms can be distinguished: an effect on skills and an effect on allocation. For the first effect we assume that education directly affects knowledge and skills that are relevant for healthy behaviour, civic engagement etc. For instance health programs may increase the knowledge of students in this area leading to healthier behaviour. The second mechanism refers to the role of education in allocating students to particular jobs or roles in society, e.g., higher education increases the chance of ending up in healthier jobs or in social networks in which civic engagement is higher. In that case the role of education is more indirect and it is not certain that investing in education will always have the anticipated effect. This is dependent on whether these outcomes are scarce resources or not. If people have to compete for scarce resources (as in the case of high-level jobs) investment in education changes the relative distribution but not the absolute.

From a policy point of view, it is therefore important to gain further insight in the underlying mechanisms. Moreover it is important to investigate to what extent low skills as a risk factor for social outcomes may be compensated by other protective factors like job conditions, educational attainment, etc.

Appendix 2 shows the purported relation between skills on one hand and economic and other outcomes on the other.

## 4. The BQ Sections

### Section A: General Information

#### **Age**

Concept definition:

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.

Question(s):

A\_Q01

#### **Sex**

Concept definition:

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):

A\_N01



## Section B: Education and Training

### ***Highest level of formal education***

#### Concept definition:

The highest level of education ever completed. Education is defined as formal education provided in the system of schools, colleges, universities and other formal educational institutions that normally constitutes a continuous “ladder” of full-time education for children and young people, generally beginning at age 5 to 7 and continuing up to 20 or 25 years old. In some countries, the upper parts of this “ladder” are constituted by organised programs of joint part-time employment and part-time participation in the regular school and university system: such programs have come to be known as the “dual system” or equivalent terms in these countries. Whether or not this is included as formal education will depend on national conventions. As a practical definition, we include as education all programs that have a distinctive place in the ISCED classification.

Educational attainment is based on ISCED coding and includes every type of education associated with obtaining a certificate or diploma the respondent has ever successfully completed. In addition, this concept provides information on when each type of education was completed. The term “successfully completed” refers to a situation where all formal requirements associated with completion of the programme have been met. In most cases this will be indicated by the awarding of a degree, diploma, or other form of certification. In some cases it is sufficient to have completed all the required classes, tutorials, etc.

The question on educational attainment follows the ISCED classification, distinguishing the following categories:

- No formal education or below ISCED1
- ISCED 1
- ISCED 2C
- ISCED 2B
- ISCED 2A
- ISCED 3C shorter than 2 years
- ISCED 3C 2 years or more
- ISCED 3A-B
- ISCED 3 (without distinction A-B-C, 2y+)
- ISCED 4C
- ISCED 4A-B
- ISCED 4 (without distinction A-B-C)
- ISCED 5B
- ISCED 5A, bachelor degree
- ISCED 5A, master degree
- ISCED 6

Concept rationale:

Education is the single best predictor of skills acquisition, labour market outcomes and other outcomes. The level of education is a critical factor for the knowledge economy and society. The importance of educational level of people for their social position is largely recognised. 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 skills in today's economy.

COUNTRY INSTRUCTION: The qualifications referred to here and elsewhere in this section are defined in terms of "formal education," according to the Classification of Learning Activities. The main characteristics of formal education are that it is provided in schools, colleges, universities or other educational institutions and leads to a certification that is taken up in the national educational classification. It is important that interviewers are trained to understand the difference between formal qualifications on one hand and training and courses as indicated in questions B\_Q12 on the other. To avoid any misunderstanding, a card with all possible national levels of education should be shown. Please make sure that this card also includes all major types of education that any respondents in your country may have followed in their lifetimes, even if they no longer exist.

Please note that ISCED also includes vocational education. Whether or not apprenticeship training is included on the show card as qualifications will depend on national conventions. Countries will be required to code this data to the ISCED97 classification. Countries will also be required to report the national codes. For each national level of education, the minimum number of years it takes to complete a programme will have to be reported.

For ISCED level 3C, countries are expected to draw a distinction between programmes that last two years or more and programmes that last less than two years.

Foreign diplomas have to be coded into ISCED levels as well. The information given by the respondent on the national level that corresponds most closely with the foreign qualification reported can assist in this coding but should not replace it.

ADAPTATION INSTRUCTION: Countries may have to adapt the wording to reflect this concept in their own country properly, such as, "What is the highest level of education you have ever successfully completed?" Countries will have to develop a national list of educational programmes that closely follows the list presented here. Please note that this question only refers to full educational programmes actually resulting in the formal qualification in question, not to single courses or modules within such programmes.

Question(s):

B\_Q01a

***Foreign qualification***

Concept definition:

If highest qualification is not gained in host country.

Concept rationale:

The value of the qualification and its impact on skills may be different for foreign qualifications.

Question(s):

B\_Q01a2

***Field of study highest qualification***

Concept definition:

The field of study of the highest level of formal education completed, coded into ISCED 97 broad fields of education and training:

- 1 General programmes
- 2 Teacher training and education science
- 3 Humanities, languages and arts
- 4 Social sciences, business and law
- 5 Science, mathematics and computing
- 6 Engineering, manufacturing and construction
- 7 Agriculture and veterinary

8 Health and welfare  
9 Services

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 competencies. 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.

ADAPTATION INSTRUCTION: Countries may have to adapt the wording to reflect this concept in their own country properly. Countries will have to develop a national list of educational programmes that closely follows the list presented here.

Question(s):

*B\_Q01b*

***Year leaving education***

Concept definition:

The year or age the respondent last left education.

Concept rationale:

The year the respondent left 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 leaving education and the time of starting work, and/or whether the respondent has worked before or during education.

Question(s):

*B\_Q01c, B\_Q03c*

***Current level of education***

Concept definition:

Current level of education provides information on the level of education the respondent is currently following. Education is defined as formal education provided in the system of schools, colleges, universities and other formal educational institutions that normally constitutes a continuous "ladder" of full-time education for children and young people, generally beginning at age 5 to 7 and continuing up to 20 or 25 years old. In some countries, the upper parts of this "ladder" are constituted by organised programs of joint part-time employment and part-time participation in the regular school and university system: Such programs have come to be known as the "dual system" or equivalent terms in these countries. As a practical definition we include as education all programs that have a distinctive place in the ISCED classification.

The level of education follows the ISCED classification, distinguishing the following categories:

- ISCED 1
  
- ISCED 2C
  
- ISCED 2B
  
- ISCED 2A
  
- ISCED 3C shorter than 2 years
  
- ISCED 3C 2 years or more
  
- ISCED 3A-B
  
- ISCED 3 (without distinction A-B-C, 2y+)
  
- ISCED 4C

- ISCED 4A-B
- ISCED 4 (without distinction A-B-C)
- ISCED 5B
- ISCED 5A, bachelor degree
- ISCED 5A, master degree
- ISCED 6

Concept rationale:

Education is the single best predictor of skills acquisition. 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. This will provide answers to questions such as: are skills increasing with age, while still in education? How are the skills affected by differences in educational experience?

COUNTRY INSTRUCTION: The answer categories and SHOW CARD should follow those used in B\_Q01a, but will differ from this list in three respects. Firstly, the first answer category (“No formal education or below ISCED 1”) must be omitted here. Secondly, the answer categories and show cards used here should only include forms of education that are currently offered by the education system in your country. Thirdly, the category “foreign qualification” should be omitted.

ADAPTATION INSTRUCTION: Countries may have to adapt the wording to reflect this concept in their own country properly, such as, “What level is the education you are currently enrolled in?” For a detailed explanation of the concept involved see the country instruction in B\_Q01a. Countries will also have to develop a national list of educational programmes that closely follows the list presented here.

Question(s):

- B\_Q02a
- B\_Q02b

***Current field of study***

Concept definition:

The field of study of current education, coded into ISCED 97 broad fields of education and training:

- 1 General programmes
- 2 Teacher training and education science
- 3 Humanities, languages and arts
- 4 Social sciences, business and law
- 5 Science, mathematics and computing
- 6 Engineering, manufacturing and construction
- 7 Agriculture and veterinary
- 8 Health and welfare
- 9 Services

Concept rationale:

Education is the single best predictor of skills acquisition. 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. 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 students in technical/science score better on math and problem solving while students in humanities score higher on literacy.

Question(s):

*B\_Q02c*

***Uncompleted highest level of education***

Concept definition:

For those who have started, but left without completing, a level of education higher than the highest level successfully completed: the level of this programme. Education is defined as formal education provided in the system of schools, colleges, universities and other formal educational institutions that normally constitutes a continuous “ladder” of full-time education for children and young people, generally beginning at age 5 to 7 and continuing up to 20 or 25 years old. In some countries, the upper parts of this “ladder” are constituted by organised programs of joint part-time employment and part-time participation in the regular school and university system: such programs have come to be known as the “dual system” or equivalent terms in these countries. Whether or not this is included as education will depend on national conventions. As a practical definition we include as education all programs that have a distinctive place in the ISCED classification.

Concept rationale:

In addition to education successfully completed, 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 clearly 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.

COUNTRY INSTRUCTION: The answer categories and SHOW CARD should follow those used in B\_Q01a, but will differ from this list in that the first answer category (“No formal education or below ISCED 1’) must be omitted here as well as the category “foreign qualification’.

ADAPTATION INSTRUCTION: Countries may have to adapt the wording to reflect this concept in their own country properly, such as “What level is the education you started studying for?” For a detailed explanation of the concept involved see the country instruction in B\_Q01a. Countries will also have to develop a national list of educational programmes that closely follows the list presented here.

Question(s):

*B\_Q03*

***Level of education during last 12 months***

Concept definition:

Information on the incidence and level of educational activities in the last 12 months will be collected (if applicable). Education is defined as formal education provided in the system of schools, colleges, universities and other formal educational institutions that normally constitutes a continuous “ladder” of full-time education for children and young people, generally beginning at age 5 to 7 and continuing up to 20 or 25 years old. In some countries, the upper parts of this “ladder” are constituted by organised programs of joint part-time employment and part-time participation in the regular school and university system: such programs have come to be known as the “dual system” or equivalent terms in these countries. Whether or not this is included as education will depend on national conventions. As a practical definition we include as education all programs that have a distinctive place in the ISCED classification.

Concept rationale:

These items provide a snapshot of human capital investments by the incidence (number of activities) of education during the previous 12 month period. Education is a key predictor of skills acquisition and subsequent labour market outcomes.

COUNTRY INSTRUCTION: The answer categories and SHOW CARD should be identical to those used in B\_Q02b.

ADAPTATION INSTRUCTION: Countries will have to develop a national list of educational programmes that closely follows the list presented. In some cases it may be necessary to split this up into two or more questions. Countries will also have to develop a national list of educational programmes that closely follows the list presented here.

Question(s):

B\_Q04-B\_Q05a

***Field of study during last 12 months***

Concept definition:

The field of study of current education, coded into ISCED 97 broad fields of education and training:

- 1 General programmes
- 2 Teacher training and education science
- 3 Humanities, languages and arts
- 4 Social sciences, business and law
- 5 Science, mathematics and computing
- 6 Engineering, manufacturing and construction
- 7 Agriculture and veterinary
- 8 Health and welfare
- 9 Services

Concept rationale:

Education is the single best predictor of skills acquisition. Looking at people who followed education in the past 12 months 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. 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 students in technical/science score better on math and problem solving while students in humanities score higher on literacy.

Question(s):

*B\_Q05b*

***Reason for participation in education***

Concept definition:

Subjective assessment by the respondent of the reason to participate in education, subdivided into job-related reasons and non-job-related reasons.

Concept rationale:

In assessing the effect of education, it is crucial to have an understanding of the reasons for taking the programme.

Question(s):

*B\_Q05c*

***Education followed during working hours***

Concept definition:

This question refers to the degree that the activity takes place during paid working hours, meaning that the working hours are used to attend the activity instead of working. It also includes the case where a number of working hours are being replaced by the learning activity, even if the activity itself takes place outside normal working time of the respondent. If the learning activity takes place outside working time 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 program itself and not homework.

Concept rationale:

This variable gives an idea of the investment by employers in the education of employees by estimating the opportunity costs.

Question(s):

*B\_Q10b*

***Usefulness of education for job***

Concept definition:

Subjective assessment by the respondent of the usefulness of following this education for the job or business he had at the time.

Concept rationale:

In assessing the effect of education, it is crucial to have an understanding of the usefulness of the programme for work.

Question(s):

B\_Q10c

***Employer's contribution to education activity***

Concept definition:

This concept provides information on how much the respondent's employer or prospective employer contributed to the expenses involved in the most educational activities, such as expenses for tuition, course materials, travel, accommodation and so forth.

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 adult education and training to have information on the providers and financing of such investments. The variable gives an idea of the investment by employers in the education by estimating whether there are direct costs.

Question(s):

B\_Q11

***Incidence, type and intensity of nonformal education (training) during last 12 months***

Concept definition:

Nonformal education is defined as "any organised and sustained educational activities that do not correspond exactly to the above definition of formal education. Nonformal education may therefore take place both within and outside educational institutions, and cater to persons of all ages. Depending on country contexts, it may cover educational programmes to impart adult literacy, basic education for out-of-school children, life-skills, work-skills, and general culture. Nonformal education programmes do not necessarily follow the "ladder" system and may have a differing duration. Information on the incidence and number of training incidents will be collected on the following types:

1. Courses through open and distance education. This covers courses which are similar to face-to-face courses, but take place via postal correspondence or electronic media, linking instructors/teachers/tutors or students who are not together in a classroom.
2. Organised sessions for on-the-job training or training by supervisors or co-workers. This type of training is characterised by planned periods of training, instruction or practical experience, using normal tools of work. It is usually organised by the employer to facilitate adaptation of (new) staff. It may include general training about the company as well as specific job-related instructions (safety and health hazards, working practices). It includes, for instance, organised training or instructions by management, supervisors or co-workers to help the respondent to do his or her job better or to introduce him/her to new tasks, but can also take place in the presence of a tutor.
3. Seminars or workshops.
4. Courses or private lessons, not already reported. This can refer to any course, regardless of the purpose (work or nonwork).

Concept rationale:

These items provide a snapshot of human capital investments by the incidence (number of activities), type of training, and the total time spent on all types 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.

Question(s):

B\_Q12, B\_Q17-20

***Reason for participation in nonformal education (training)***

Concept definition:

Subjective assessment by the respondent of the reason to participate in the most recent training episode.

Concept rationale:

In assessing the effect of training, it is crucial to have an understanding of the reasons for taking the activity.

Question(s):

B\_Q14

***Nonformal education (training) followed during working hours***

Concept definition:

This question refers to the degree that the activity takes place during paid working hours meaning that the working hours are used to attend the activity instead of working. It also includes the case where a number of working hours are being replaced by the learning activity even if the activity itself takes place outside normal working time of the respondent. If the learning activity takes place outside working time 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.

Concept rationale:

This variable gives an idea of the investment by employers in the training by estimating the opportunity costs.

Question(s):

B\_Q15a-b

***Usefulness of training for job***

Concept definition:

Subjective assessment by the respondent of the usefulness of following this training for the job or business he had at the time.

Concept rationale:

In assessing the effect of training, it is crucial to have an understanding of the usefulness of the programme for work.

Question(s):

B\_Q15c

***Employer's contribution to training activity***

Concept definition:

This concept provides information on how much the respondent's employer contributed to the expenses involved in the most recent training activity, such as expenses for tuition, course materials, travel, accommodation and so forth.

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 adult education and training to have information on the providers and financing of such investments. The variable gives an idea of the investment by employers in the training by estimating whether there are direct costs.

Question(s):

B\_Q16

***Barriers to training participation***

Concept definition:

This concept provides information on why the respondent did not follow an activity he or she wanted to follow in the past 12 months.

Concept rationale:



Information on barriers to training is important from a policy point of view. In addition, the question could be used to construct an Instrumental Variable (IV) for the effect of nonformal training on labour market outcomes.

Question(s):

*B\_Q26*

## Section C: Current status and work history

### **Current labour status**

#### Concept definition:

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. The specific steps may include registration at a public or private employment exchange; application to employers; checking at worksites, farms, factory gates, market or other assembly places; placing or answering newspaper advertisements; seeking assistance of friends or relatives; looking for land, building, machinery or equipment to establish own enterprise; arranging for financial resources; applying for permits and licences, etc.

Labour force status as calculated in C\_D05 (derived variable):

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

```
If (C_Q01a=1 or C_Q01b=1 or C_Q01c=1), then C_D05=1
else if (C_Q02a=1 and (C_D04=1 and C_Q05=1)), then C_D05=2
else if (C_Q02c=1 and C_Q05=1), then C_D05=2
else if ((C_Q01a=2 and C_Q01b=2 and C_Q01c=2) and (C_Q02a=2 or C_Q02b=2 or
C_Q02c=2)), then C_D05=3
else if ((C_D04=2 and C_Q02a=1) or C_Q05=2), then C_D05=3
else C_D05=4
end if
```

#### 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 status also acts as a filter question, directing those not currently employed past questions pertaining to current employment situation.

Question(s):

C\_Q01a to C\_Q05

### ***Taking active steps***

Concept definition:

For the definition of the unemployed it is crucial to consider whether he or she took specific steps in a specified reference period to seek paid employment or self-employment. The specific steps may include registration at a public or private employment exchange; application to employers; checking at worksites, farms, factory gates, market or other assembly places; placing or answering newspaper advertisements; seeking assistance of friends or relatives; looking for land, building, machinery or equipment to establish own enterprise; arranging for financial resources; applying for permits and licences, etc. In our definition, studying job advertisements is NOT considered an active step. All other specific steps are considered active steps.

Concept rationale:

For the definition of the unemployed it is crucial to consider whether he or she took specific steps in a specified reference period to seek paid employment or self-employment.

Question(s):

C\_Q04

### ***Number of months looking for paid work***

Concept definition:

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):

C\_S03

### ***Self-declared main status***

Concept definition:

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):

C\_Q07

### ***Ever employed***

Concept definition:

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.

ADAPTATION INSTRUCTION: Countries may have to adapt the wording to reflect the national situation. In some countries, it may be necessary to extend the question to include other work-related categories, e.g., a place on a government scheme.

Question(s):

C\_Q08a

### ***Recent work experience***

Concept definition:

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):

C\_Q08b

### ***End of last employment***

Concept definition:

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):

C\_Q08c

### ***Number of years employed***

Concept definition:

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):

C\_Q09

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

Concept definition:

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. The derived variable will be calculated as follows: If (C\_Q01a=yes or C\_Q01b=yes or C\_Q01c=yes), then C\_D09= currently working (paid or unpaid)

else if (C\_Q08a=yes and C\_Q08b=yes), then C\_D09= Recent work experience in last 12 months

else if (C\_Q08a=yes and C\_Q08b=no), then C\_D09= Left paid work longer than 12 months ago

else if (C\_Q08a=no), then C\_D09= No work experience

else C\_D09= Status unknown

Concept rationale:

This concept will be used for the routing.

Question(s):

C\_D09

### ***Changes of employer***

Concept definition:

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):

C\_Q10a

## Section D/E: Current or recent work

### ***Occupation in employment***

#### Concept definition:

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 by occupation 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” and “social mobility” researchers pay 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 and on social class have 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 classifying variable, and is also used as input into various socioeconomic classification schemes (based on Eurostat, 2007).

COUNTRY INSTRUCTION: The information gathered in questions D\_Q01a and D\_Q01b will be used to code occupation to 4 digit ISCO2008.

ADAPTATION INSTRUCTION: Questions D\_Q01a and D\_Q01b should be considered as indicative of the kinds of questions that should be asked. Countries should apply a set of standard questions that is appropriate for coding occupations in their country, which may or may not correspond to these questions. If necessary, appropriate examples can be provided.

#### Question(s):

*D\_Q01/E\_Q01*

### ***Economic sector in employment***

#### Concept definition:

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).

COUNTRY INSTRUCTION: The information gathered in questions D\_Q02a and D\_Q02b will be used to code industry to 4 digit ISIC.

ADAPTATION INSTRUCTION: Questions D\_Q02a and D\_Q02b should be considered as indicative of the kinds of questions that should be asked. Countries should apply a set of standard questions that is appropriate for coding industries in their country, which may or may not correspond to these questions. If necessary, appropriate examples can be provided.

#### Question(s):

*D\_Q02/E\_Q02*

### **Public/private sector/nonprofit organisation**

#### Concept definition:

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):

*D\_Q03/E\_Q03*

### **Status in employment**

#### Concept definition:

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).

**TRANSLATION INSTRUCTION:** Countries need to pay attention to the appropriate translation of the terms "employee" and "self-employed."

#### Question(s):

*D\_Q04/E\_Q04*

### **Employment contract**

#### Concept definition:

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).

#### Concept rationale:

The type of contract directly affects the job security of the employee and is thus a relevant economic outcome.

Question(s):

D\_Q09/E\_Q08

### **Tenure**

Concept definition:

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.

TRANSLATION INSTRUCTION: Countries may need to pay attention to the appropriate translation of the word *employer*. If necessary, this may be changed to fit the terminology that is generally used in your country, such as “employer/firm” or “organisation.”.

Question(s):

D\_Q05/E\_Q05

### **Organisation size**

Concept definition:

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):

D\_Q06a/E\_Q06

### **Change in organisation size**

Concept definition:

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):

D\_Q06b

### **Other locations of organisation**

Concept definition:

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):

D\_Q06c

### **Number of employees**

Concept definition:

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):

D\_Q07/E\_Q07

***Supervisory status***

Concept definition:

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.

TRANSLATION INSTRUCTION: Countries may need to pay attention to the appropriate translation of the phrase “manage or supervise.”

Question(s):

D\_Q08

***Working hours***

Concept definition:

This item provides information on usually worked hours including paid or unpaid overtime.

Concept rationale:

Economic and social outcome.

Question(s):

D\_Q10/E\_Q09

***Work autonomy***

Concept definition:

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):

D\_Q11

***Education-job match***

Concept definition:

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).

ADAPTATION INSTRUCTION: Countries should develop their own list of current national levels that allows recoding into the categories given below. It is important that the national list is ordered in the same way as below, that is, from the lowest to the highest level. Countries will also have to develop a national list of educational programmes that closely follows the list presented here.

COUNTRY INSTRUCTION: The answer categories and SHOW CARD should be identical to those used in B\_Q01a, except that the answer category 15 (Foreign qualification) should be omitted.

Question(s):

D\_Q12a

D\_Q12b

**Required work experience**Concept definition:

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. As such it provides important additional value, as most skills requirements as measured in the JRA are generic.

Question(s):

*D\_Q12c*

**Learning environment**Concept definition:

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):

*D\_Q13*

**Job satisfaction**Concept definition:

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):

*D\_Q14*

**Earnings**Concept definition:

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):

*D\_Q16 to D\_Q18*

**Reason for leaving job**Concept definition:

The main reason given by those not currently employed for leaving the last job they held.

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):

*E\_Q10*

## Section F: Skills used at work

### ***Job Requirements Approach (JRA)***

#### Concept definition:

In the JRA module, respondents will be asked questions about the skills that they use at work. First, the module will generate very many items describing the generic activities involved in doing the job. The choice of items is informed by theories of skill and the practices of commercial occupational psychology. To reduce the multiple items to a smaller and theoretically meaningful set of generic skills, statistical techniques are used to generate several generic skill indicators from the responses on these items.

The items relate to the following domains: cooperation (F\_Q01b), horizontal interaction (F\_Q02a-c) and client interaction (F2d-e), self-direction (F\_Q03a, c), managerial skills (F\_Q03b), influence (F\_Q04a-b), problem-solving (F\_Q05a-b) and physical skills (stamina (F\_Q06b) and manual skill (F\_Q06c)).

#### Concept rationale:

The main arguments for developing a separate JRA module for PIAAC were the following:

- The direct assessments in PIAAC are limited to relatively few, albeit crucial, skill domains. Yet there was a widespread feeling, supported by some case studies, that other skills were becoming increasingly relevant in modern workplaces. Important examples were communication skills and the skills needed to work within teams, 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 (Dickerson and Green, 2004). It was intended that the JRA module would provide a cost-effective way of assessing the relevance of these skills.
- Earlier skills surveys like 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. 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.

#### Question(s):

F\_Q01 – F\_Q06

### ***Skills utilisation: underutilisation and overutilisation***

#### Concept definition:

Underutilisation of skills 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. Overutilisation refers to a situation where the respondent needs additional training to cope with the duties of the job.

#### Concept rationale:

Underutilisation and overutilisation are important outcome variables. 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.

#### Question(s):

F\_Q07

## **Section G/H: Skill Use Literacy, Numeracy and ICT**

### ***Reading skill use***

#### Concept definition:

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):

G\_Q01/H\_Q01

### ***Writing skill use***

#### Concept definition:

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):

G\_Q02/H\_Q02

### ***Numeracy skill use***

#### Concept definition:

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):

G\_Q03/H\_Q03

### ***Access to ICT***

#### Concept definition:

These ask whether the respondent has ever used a PC or a laptop.

#### Concept rationale:

Having access to ICT is a prerequisite for developing ICT skills. This question will be used as a filter question.

#### Question(s):

G\_Q04/H\_q04

### ***ICT skill use***

#### Concept definition:

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 uses of skills in the domains of the DA are 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):

G\_Q05/H\_Q05

***Level of computer skills needed at work and mismatches***

Concept definition:

This question aims to provide a measure of level of ICT skills needed in the current job/last job and a possible mismatch.

Concept rationale:

The level of required ICT skills is an important aspect of the job and indicates how ICT developments impact the need for ICT skills. Mismatches may affect current job functioning and/or past career.

Question(s):

G\_Q06-G\_Q08

## Section I: About yourself

### ***Metacognitive abilities***

#### Concept definition:

Metacognitive abilities structure the learning process and affect the efficiency with which new information is being processed. Most of the existing scales have been developed for students (e.g., the concept of self-regulated learning in PISA 2000). Other approaches by Kirby et al., (2003) explicitly look at learning approaches at work, but these are not always consistent with the student-approaches. For PIAAC we developed a new set of items, based on both approaches. The items aim to measure the extent of elaborate or deep learning.

#### Concept rationale:

There is good empirical evidence that learning strategies affect the acquisition of skills and educational attainment. This measure is important as a control variable to get good estimates of the effects of education and training on skills.

#### Question(s):

I\_Q04

### ***Voluntary work***

#### Concept definition:

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):

I\_Q05f

### ***Political efficacy***

#### Concept definition:

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.

#### Question(s):

I\_Q06a

### ***Social trust***

#### Concept definition:

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):

I\_Q07a-b

### ***General health***

#### Concept definition:

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):  
I\_Q08

## **Section J: Background information**

### **Household composition**

#### Concept definition:

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:

Many issues (housing problems etc) focus on data at the household level rather than the individual level. Household type is also extremely useful to have the information on dynamics of household structure (based on Eurostat, 2007).

#### Question(s):

J\_Q01

J\_Q02a

### **Children**

#### Concept definition:

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

#### Concept rationale:

Having children can affect careers, leading to delays, interruptions, etc., particularly for women.

#### Question(s):

J\_Q03

### **Partner's main status**

#### Concept definition:

The current or normal "main activity status" of the partner or spouse. See also C\_Q07.

#### Concept rationale:

Research has clearly pointed out that an individual's educational attainment and occupational outcomes are closely related to the educational attainment of the partner.

#### Question(s):



J\_Q02c

**Country of birth**

Concept definition:

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.

ADAPTATION INSTRUCTION: Countries are required to provide a partly precoded list of countries #Country 1, #Country 2, etc., that are expected to be reported frequently in their country. Both the number of listed countries and the specific selection of countries will vary from country to country.

Question(s):

J\_Q04a

J\_Q04b

**Year of immigration**

Concept definition:

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 variable 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.

ADAPTATION INSTRUCTION: For some countries, it might be important to find a different expression that captures first moving to the country on a continuous basis. Countries need to insert their own country name in #CountryName

Question(s):

J\_Q04c1,2

**Linguistic familiarity**

Concept definition:

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):

J\_Q05

**Mother's country of origin**

Concept definition:

We will distinguish whether the mother was born in the host country or not.

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. Needed to distinguish between first and second generation immigrants.

Question(s):

J\_Q06a

**Mother's education**Concept definition:

Highest level of education the respondent's mother has ever completed, coded into primary or lower secondary education, upper 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.

COUNTRY INSTRUCTION: Countries will have to develop a national specific show card which allows them to convert into the three levels that are distinguished below.

ISCED123cshort refers to primary or lower secondary education (ISCED levels 1 and 2 and 3c short), ISCED3excl3c4 refers to upper secondary education (ISCED levels 3 excluding 3c short and 4) and ISCED56 refers to tertiary education (ISCED levels 5 and 6)

ADAPTATION INSTRUCTION: Countries may have to adapt the wording to reflect this concept in their own country properly, such as "What was the highest qualification she ever attained"?

Question(s):

J\_Q06b

**Father's country of origin**Concept definition:

We will distinguish whether the father was born in the host country or not. 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. Needed to distinguish between first and second generation immigrants.

Question(s):

J\_Q07a

**Father's education**Concept definition:

Highest level of education the respondent's father has ever completed, coded into primary or lower secondary education, upper 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/her parents.

COUNTRY INSTRUCTION: Countries will have to develop a national specific show card which allows them to convert into the three levels that are distinguished below.

ISCED123cshort refers to primary or lower secondary education (ISCED levels 1 and 2 and 3c short), ISCED3excl3c4 refers to upper secondary education (ISCED levels 3 excluding 3c short and 4) and ISCED56 refers to tertiary education (ISCED levels 5 and 6)

ADAPTATION INSTRUCTION: Countries may have to adapt the wording to reflect this concept in their own country properly, such as "What was the highest qualification he attained"?

Question(s):

J\_Q07b

**Parent's cultural capital**Concept definition:

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.

Question(s):

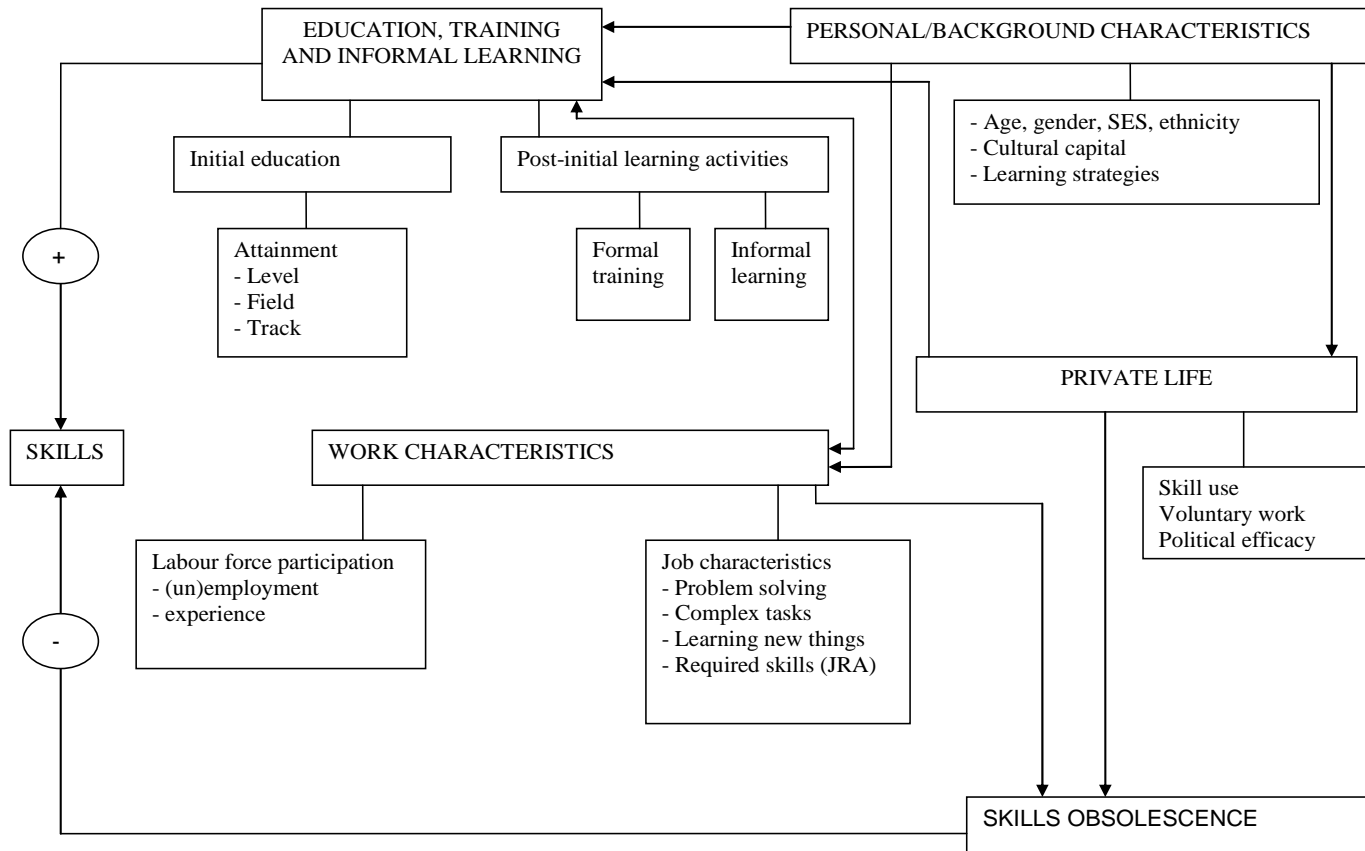
*J\_Q08*

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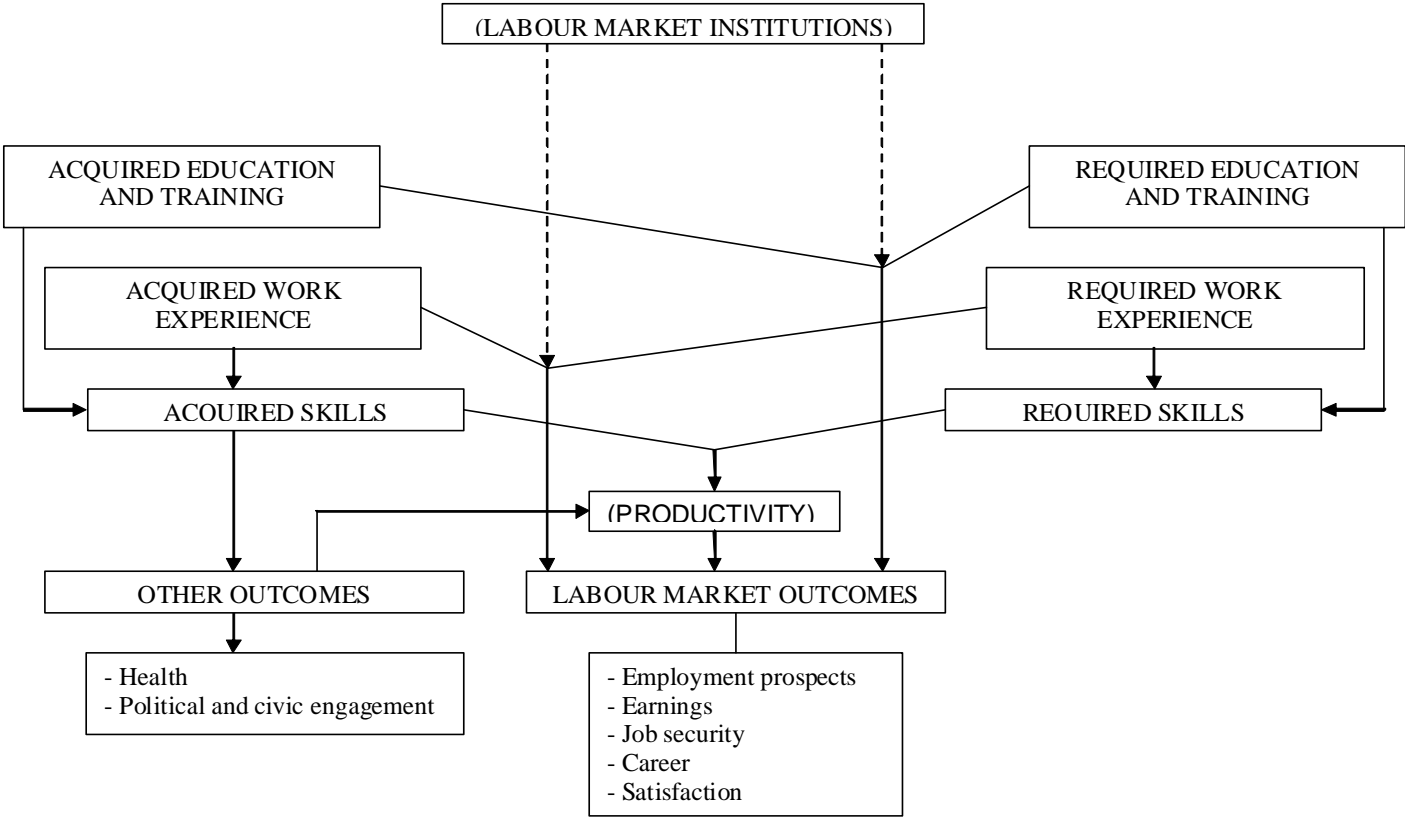
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**Appendix 1: Schematic Representation of Skill Acquisition and Decline**



**Appendix 2: Schematic Representation of Economic and Social Outcomes**



### Appendix 3: Overview of concepts

Concept	Descriptive analysis	Determinants of skills	Economic and social outcomes	Control variables
Direct assessment literacy, numeracy, ICT, problem solving				
Skill use literacy, numeracy, ICT, problem solving, etc.				
Skill use in other domains				
Sex	(reporting category)			
Age	(reporting category)			
Education parents	(reporting category)			
Migration status	(reporting category)			
Cultural capital parental home				
Mother tongue				
Language spoken at home				
Metacognitive abilities				
Region	(reporting category)			
Highest level of education	(reporting category)			
Qualifications not completed				
Field of study				
Current/recent training				
Employers' contribution to training costs				
Training undertaken in working time				
Reasons for training (work-related versus non-work-related)				
Work experience (total duration, changes of employer)				
On-the-job training				
Informal learning at work				
Current main status	(reporting category)			
Occupation	(reporting category)			
Economic sector	(reporting category)			
Employed vs. self-employed				
Supervisory status				
Tenure current job				



<b>Concept</b>	<b>Descriptive analysis</b>	<b>Determinants of skills</b>	<b>Economic and social outcomes</b>	<b>Control variables</b>
Firm size	(reporting category)			
Job security				
Working hours				
Earnings				
Education-job match				
General health status				
Voluntary work				
Political efficacy				
Social trust				