

HOW TO IMPROVE ADULT LITERACY AND NUMERACY SKILLS? SOME RESULTS OF INTERNATIONAL RESEARCH PIAAC

Marko Radovan

Faculty of Arts, University of Ljubljana
marko.radovan@ff.uni-lj.si

Summary

In this paper we are dealing with importance and impact of adult's literacy and numeracy skills. We first examine how are those skills valuable for adults in their working and private lives. We do that with presenting evidence from international study "Programme for the International Assessment of Adult Competencies – PIAAC" (OECD, 2016). International analysis shows that the level of skills measured by PIAAC in most OECD countries is low. This is alarming, because PIAAC data show that the level of reading and numeracy skills has a significant impact on the possibilities of further education and employment. Our analysis also show that the level of skill is strongly linked to the level of education and decreases throughout the years. In the article we will deal with the question of how adults with low literacy and numeracy skills use their skills and how this is reflected in their participation in learning.

Key words: *adult skills; literacy; numeracy; participation in adult education; PIAAC*

Introduction

In the introductory part of the paper, we will first clarify the fundamentals of the dilemmas and basic principles of the concept of competencies and the importance that the skills have on the individual's personal and professional life. In the continuation of the paper we will mainly ask ourselves how the level of skills affects individuals in their participation in education, characteristics of employment, and other outcomes. We will also be interested in the differences in the use of skills adults use in the workplace. Based on the analysis of PIAAC data we will make some policy recommendations that will address the priorities of further skills development of adults in Slovenia.

Competence concept

Further education is very important in terms of developing skills and competencies of an individual. With the concept of lifelong learning, the distinction between skills acquired by an individual in his youth (in formal education) and those resulting from non-formal education and informal learning in various work and life situations is reduced (Coffield, 2000; Vermaak, 1985). Of course, this does not mean that formal education is not essential for the development of general skills and competencies and for developing and maintaining the level of skills and their upgrading in adulthood. Studies show that the level of formal education is always one of the most important factors determining the level of skills and competencies (Grotlüschen, Mallows, Reder, & Sabatini, 2016; Muršak & Radovan, 2015; OECD, 2016).

Competencies and skills are the basis of observation in the PIAAC survey and are, according to some authors, measures that more accurately predict individual productivity and opportunities in modern society. The emergence of competencies in education is not a novelty. In the European educational area, this idea was first strengthened in the 1990s in the field of vocational and technical education, and from there it expanded into higher education. In the higher education area, the idea has been particularly intensively spread over the last decade with the so-called Bologna process. Competencies also play an important role when comparing individuals and their abilities in the living and working environment. When assessing competencies, we usually ask about their education, qualifications and work-specific competencies. Since education and qualification are both linked to certain formal legal frameworks (both concepts are linked to certificates and official regulation within individual administrative, civil or state units), especially in the context of the establishment of a single European Qualifications Framework - EQF (European Communities, 2008), the notion of competence often appears as the only criterion for comparison.

As it turns out, competencies are hard to define and measure. An influential study prepared by Winterton et al. (2006) for Cedefop points out that there is considerable terminological confusion within the concept of competencies and that it is impossible to find or recognize a unified, coherent use of this term (Winterton, Delamare-Le Dest, & Stringfellow, 2006). This confusion often reflects the mixture of different concepts and the inconsistent use of terms as well as the various cultural traditions in which concepts of competence is being developed (Winterton et al., 2006). In addition to the many definitions of competencies we know today, the definition that was defined by experts within the OECD is particularly influential. OECD (2002) defines competence as *"... the ability to meet individual and social requirements successfully, or to perform an activity or task [...] Each competence is built on a combination of interrelated cognitive and practical skills, knowledge (including tacit knowledge), motivation ..."* (OECD, 2002, p. 8).

Consequently, competencies are understood to be a synergy of several factors, and it should be therefore borne in mind that competence is not only the sum of individual

resources, such as skills and knowledge, but also the method of mobilizing resources. Thus, merely (mathematical) aggregation of skills and knowledge will not lead to an individual acquiring a certain competence. The acquisition of competencies is also related to personality traits and context, so it is extremely important that we understand them holistically, and these dimensions are necessarily equivalent to each other.

From the point of view of measuring and comparing knowledge and skills, it is an extremely important question whether, based on a given result or achievement, it is actually possible to deduce whether the individual has developed some competence and, if so, to what extent, with what knowledge, intellectual skills and what abilities that person has. If the competence is a composite category, it is important for us to measure at least those components that we have mentioned above.

The planning of measurement and validation of measurable constituents of competencies (i.e. knowledge, cognitive and practical skills) is, in this sense, moving between two psychological orientations. Behavioral direction tends to reduce competence or its measurement to the result. Such an approach is more common in the context of HRM theory. Delamare-Le Deist and Wintertorn (2005) thus draw attention to the *“split between the rational approach prevailing in vocational and professional education systems and the interpretive approach that has become more widespread among human resource development (HRM)”* (Delamare-Le Deist & Winterton, 2005, p. 41). Another, more cognitive-oriented competence measurement, is typical for situations where we are interested in the general level of skill development, knowledge, and it focuses on the complexity of thought processes that accompany the processes of understanding and interpretation, solving problems, recognizing interconnections and legality. The object of measurement are therefore also the strategies that the individual uses and the appropriate placement in the situation with the relations that arise thereon.

The importance of adult skills

With this in mind, PIAAC research – also known as the “Survey of Adult Skills” – does not focus on competence as a whole, but only its “measurable part” – skills. Adults’ skill are important for several reasons: they are highly connected with participation in adult education and training, they impact productivity, well-being, and also individual’s participation in the society as a whole.

One of the most important correlation of skills is with participation in adult education. Commission of the European Communities (2006) in its statement in publication “Adult Education: It is never too late to learn”, emphasizes that adult learning increases social profitability in terms of greater participation in society, better health and greater prosperity of the individual. The Commission argues that participation in adult education not only “transforms people’s lives”, but also enables them to more effectively deal with everyday life, maintain mental and physical health, increase their well-being, self-confidence and social inclusion. According to the Commission, participation in life-long learning is therefore closely linked to raising general levels of competence and

providing basic skills (Commission of the European Communities, 2006). The links between participation in formal and non-formal education and the level of formal education have already been proven repeatedly and have already been thematized in professional literature (Ivančič & Radovan, 2013). The link between the level of skills and the level of formal education is also usually positive, but there are differences between different countries in terms of how much individuals vary in level of skills given the same level of education.

Skill are very important also in work-related setting. As is evident from other analyzes, the use of ICT and reading skills are most closely related to the level of earnings, even if differences in the level of education are taken into account (OECD, 2016). More efficient use of skills at work is also more related to greater job satisfaction, than level of education attained or the level of measured skills (OECD, 2016, p. 76). For this reason, the concept of using skills was sometimes closely linked to the quality of work (e.g. Green & Riddell, 2013), with possible "spill-over" effects that relate to life satisfaction and, in general, with better health.

It is true, that the PIAAC research is predominantly focused on the impact of skills that are reflected in the economic field (e.g. impact on personal income, employability, etc.), and less attention is paid to non-economic factors, such as the link between skills and activity in the area of active citizenship, social cohesion and personal development. Nevertheless, there is a focus on at least some of these issues. In this regard, PIAAC focuses on the questions and issues of participation in volunteering activities, the level of trust, the influence on political processes and self-assessment of health, which are defined as four dimensions of social and personal well-being, understood in a broader sense (OECD, 2016). It is important that this questions are addressed, since Desjardins (2008, p. 26) draws attention to the link between education and well-being and illustrates it with Campbell's efforts to explore the links between education and non-economic outcomes, such as civic engagement and trust (Campbell, 2006). Desjardins (2008) notes that it is not necessary for individuals with a higher level of education to have more confidence in others, but at the same time points out that, if people around these individuals are more educated, it is more likely that they will be more trustworthy. Desjardins (2008) believes that in societies where there is a great disparity in the level of educational attainment among specific social groups, there could be a lack of trust among these groups. Hence, the distribution of education in society can have a major impact on social cohesion and, consequently, on social trust.

About PIAAC research

The PIAAC research (Programme for the International Assessment of Adult Competencies) measures literacy and numeracy skills and problem-solving skills in technology-rich environments. These are information processing skills that are important in many social contexts and work situations, as well as in the integration into the labor market, lifelong learning, active social and private life. The research was conducted in

three rounds: the first involved 24 countries (2008-2013), the other nine (2012-2016) and the third six countries (2016-2019). So far, 38 countries and over 200,000 adults have participated in the survey.

The study involved adults aged 16 to 65 who lived in the country, regardless of their nationality, ethnicity and language, and who were not institutionalized at the time of the interview. The size of the sample in each country largely depends on the choice of cognitive areas that were included in the survey and on the number of languages in which data were collected. Samples in individual countries ranged from at least 4,000 to almost 27,300 individuals. In all countries, the survey was conducted by qualified interviewers. Responding to the basic (background) questionnaire was done with the computer (Computer-Aided Personal Interview – CAPI) and lasted between 30 and 45 minutes. After completing the background questionnaire, the respondent solved the tasks with the help of a computer or on paper. The choice of one or the other was dependent on individual's computer skills. The time to solve tasks in this part was not limited, and on average, cognitive testing took about 50 minutes.

The main part of the research is the achievements of adults in three areas of skills:

- **literacy skills** are defined as the individual's ability to understand, evaluate, use and engage with written texts in order to participate in society, to achieve their goals and to develop their knowledge and potential;
- **numeracy skills** are defined as the ability to access and use mathematical information and ideas, to use, interpret and communicate with the aim of tackling mathematical requirements in various situations in the lives of adults and mastering them;
- **problem solving in technology-rich environments** is defined as the ability to use digital technology, communication tools and the network to obtain and evaluate information, communicate with others and perform practical tasks.

The results in the field of individual skills are ranked on a scale of 500 points; a higher score on this scale means more developed skill in a particular field. For easier understanding and interpretation of results, the scale is divided into different levels. In the field of literacy and numeracy skills, six levels are defined (from the lowest level – less than 1 – to the highest – level 5) and four levels in the field of problem-solving skills in technology-rich environments (from the lowest level – less than 1 – up to the highest level 3). In addition to demographic and general data on the education and occupation of an individual, the PIAAC study also collects information on the activities related to the literacy and numeracy skills of respondents, the use of ICT skills at work and in everyday life, and the generic skills required by individuals at work.

The purpose of the research

In our paper, we want to examine whether and how a higher level of skills is linked to some demographic characteristics and how it contributes to better outcomes in different areas of individual engagement (e.g. using skills in the workplace, greater

involvement in the social environment). The next set of analysis will address the problem of age and the possible decline or development of measured skills with age. Age is an important factor in the development and decline of skills (Desjardins & Warnke, 2012; Green & Riddell, 2013; Paccagnella, 2016; Wilson et al., 2009). Answers to these questions can give guidance on what skills the education system should develop, and those that do not need to be given much attention.

RESULTS

Level of literacy skills and some characteristics of adults

Adults with a low level of skills are defined as those who have been ranked at the 1st or lower level of literacy or numeracy skills. At this level they can successfully complete reading tasks, which include only short and simple texts and mathematical tasks that involve only basic operations. This is a group of individuals who are most at risk of being marginalized in a modern society, where knowledge and the ability to access and process information is still crucial not only for success in the job market but also for participation in a wider society (Grotlüschen et al., 2016). Figure 1 shows how the very low literacy rate is widespread in most of the countries that participated in the survey. Even in Japan, the country with the highest literacy level, 9 % of adults ranked at the lowest levels of literacy and numeracy. The same is true for approximately 17 % of surveyed individuals in Norway, Slovakia and the Czech Republic, and for 31 % in Slovenia and Singapore. In Greece, Spain and Israel, the number of such individuals is 36 %, while in Indonesia and Chile it is over 60 %.

Participation in adult education has many work and non-work-related benefits (Desjardins, 2008; Grotlüschen et al., 2016). As it is shown in Figure 2, in all countries, adults at the highest levels of literacy or numeracy skills are most active in formal and non-formal adult education. On average, among 22 countries, only 30 % of adults on Level 1 or less in literacy and numeracy skills have participated in some form of adult education and training. Although more than 40 % of adults with low literacy in Norway, Sweden, Denmark and the Netherlands reported participation in adult education, numbers are still below the level of participation of the entire population. The difference in participation rates among adults with low and high literacy is on average 44 percentage points (30 % vs. 74 %). In the case of formal education, this difference is 12 percentage points (6 % compared to 18 %). In relative terms, the difference in degrees is even greater in the case of formal education, where highly qualified adults are three times more likely to participate in this kind of education than adults with a low level of skill (Grotlüschen et al., 2016).

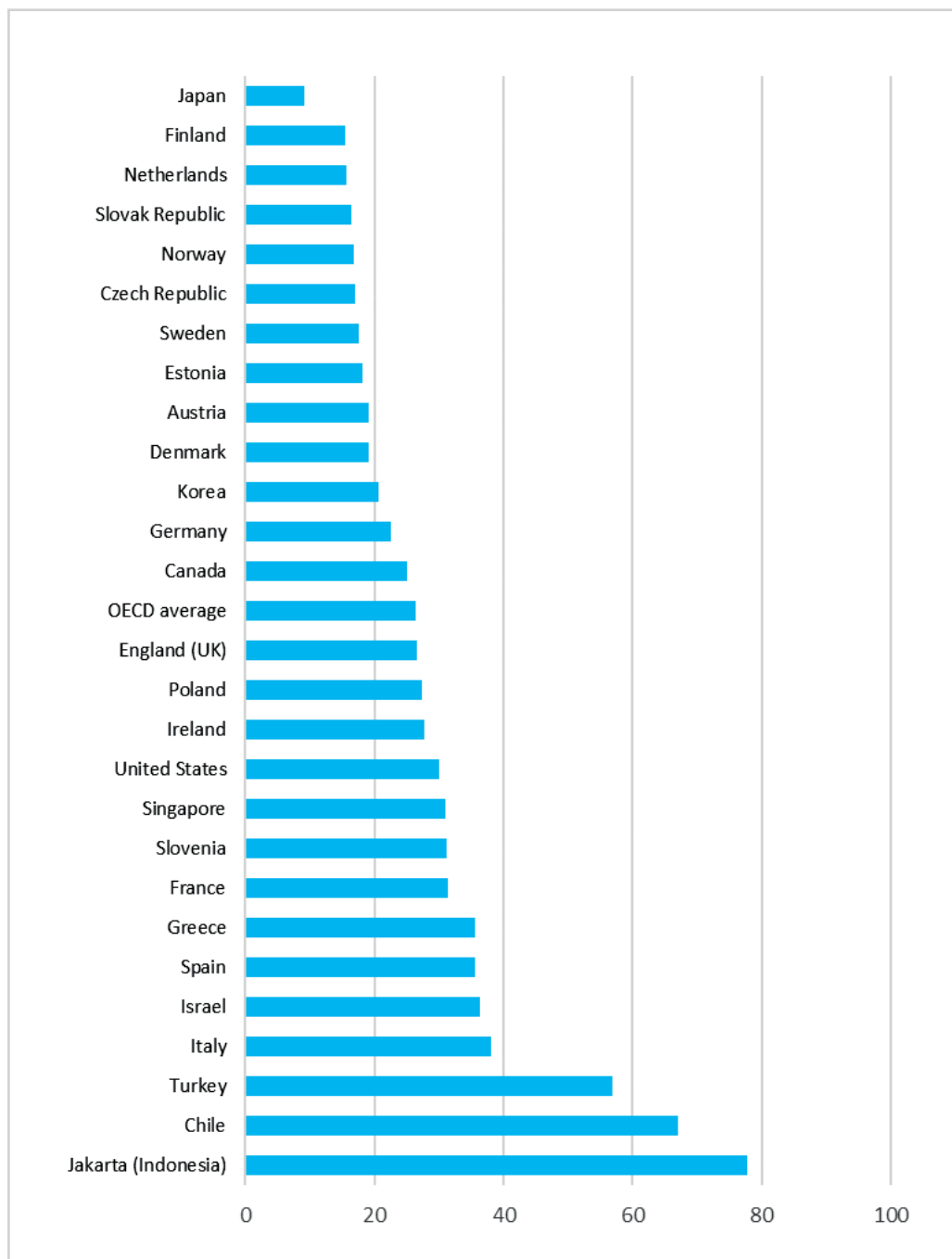


Fig. 1: Percentage of adults who score at Level 1 or below Level 1 in literacy and/or numeracy skills

Source: Survey of Adult Skills (PIAAC) (2012, 2015)

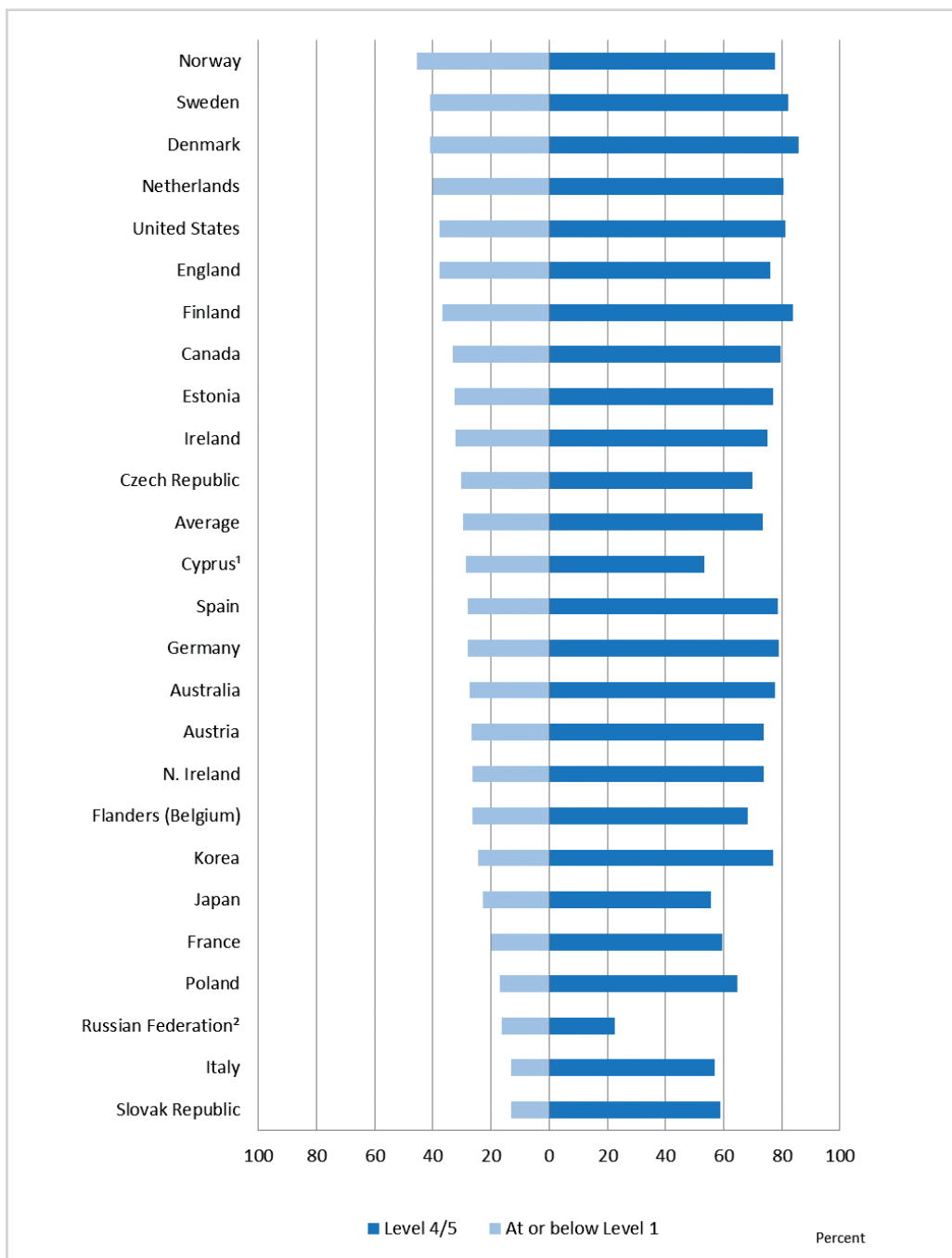


Fig. 2: Percentage of adults 25-65 years old at Level 1 and below and at Level 4/5 in literacy, engaged in formal or non-formal adult education training
 Source: Survey of Adult Skills (PIAAC) (2012)

Although adults with a low level of literacy and digital skills are those who need education most, they participate in these activities the least. Given that cognitive abilities are deteriorating with age if they are not maintained, adults without a basic skill will most likely experience a “low-skilled trap”. This term was used by Burdett and Smith (2002) to show that the level of low literacy and digital skills can lead to a less favorable initial position in the job market, which can lead to unemployment or a low paid job, and consequently less developmental and career prospects (Burdett & Smith, 2002).

Figure 3 shows an overview of the difference in results associated with different socio-demographic characteristics. Of all the socio-demographic characteristics that were included in the analysis, the level of educational attainment is the most connected with the level of literacy and numeracy skills.

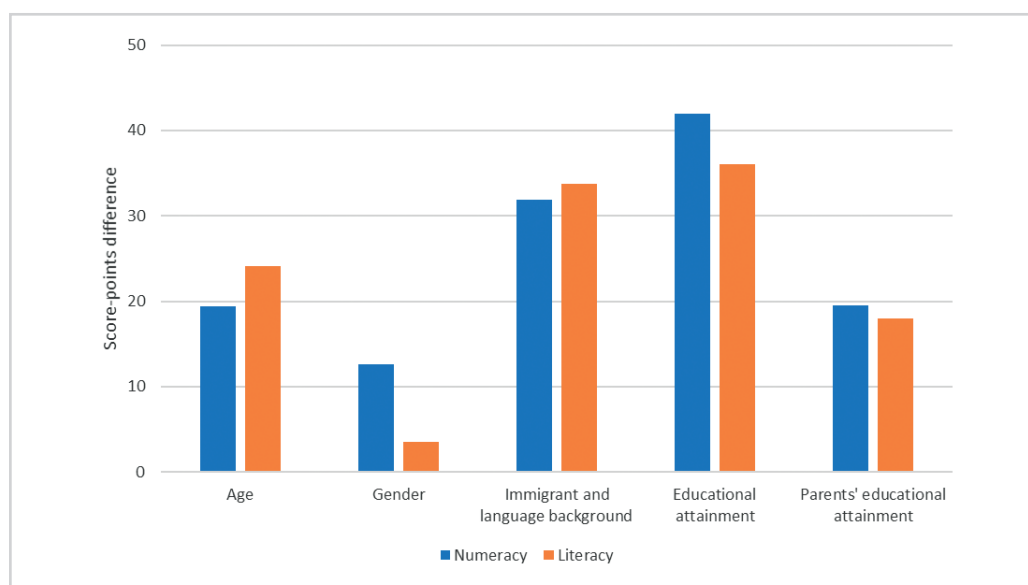


Fig. 3: Differences in numeracy and literacy scores by socio-demographic characteristics (OECD average)
Source: Survey of Adult Skills (PIAAC) (2012, 2015)

The skill level is also strongly linked to age. Cognitive abilities are generally highest in the mid-20s through the early thirties, and then they are gradually decreasing (Desjardins and Warnke, 2012; Paccagnella, 2016). In the Adult Skills Survey, the elderly (55-65 years old) achieved an average of almost 30 points less from those aged 25-34. However, there are significant differences between countries in the strength of the relationship between skills and age. This suggests that the development of skills in life is not determined solely by biological factors, but also societal (OECD, 2016). The difference in literacy between men and women is negligible. Men placed slightly better in the field of numeracy skills – they average around 10 points higher than women. Gender

differences are becoming pronounced with age. This could be reflected either by the fact that gender differences are relative to the level of education attained or that women’s skills fall faster because they are less involved in the job market. Native-born adults on average score 24 points more than foreigners, migrants. However, migrants whose mother tongue is identical to the language of the host country have achieved much higher results than other migrants and are often almost as successful as native-born adults. The greatest gaps in literacy skills are usually associated with differences in the level of education – this is true also for our analysis. Adults with a high level of education achieve over 60 points better on average than adults with less than secondary education. The socio-economic background also affects the level of skill. Among these factors, the most important indicator is education of parents. Having at least one of the parents with a tertiary qualification on average means that those individuals scored on average 40 points higher than adults with less educated parents.

Use of skills at work and literacy and numeracy skills

Many skills are not applied at work. There are several studies that show that better use of skills at the company level is associated with higher productivity and higher employee returns (Hanushek, Schwerdt, Wiederhold, & Woessmann, 2015). Some also argue that better use of skills promotes investment, employee engagement and innovation (Wright & Sissons, 2012).

One of the key questions regarding the use of skills at work is whether it reflects the level of skills directly measured in PIAAC. Figures 4a and 4b reveal the relationship between the self-reported use of skills in the workplace to the level of skills at the level of selected countries. In general, we can say that in countries where adults have reached higher levels of skill, they also more often use those skills in their work.

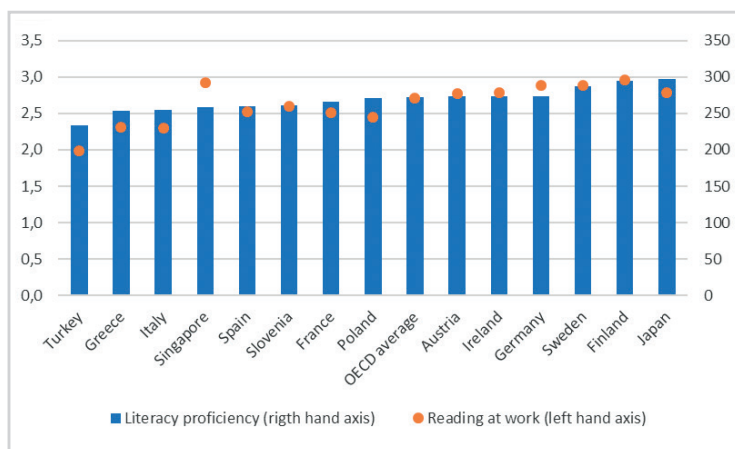


Fig. 4a: Skills use at work and literacy skills proficiency of the working population
 Source: Survey of Adult Skills (PIAAC) (2012, 2015)

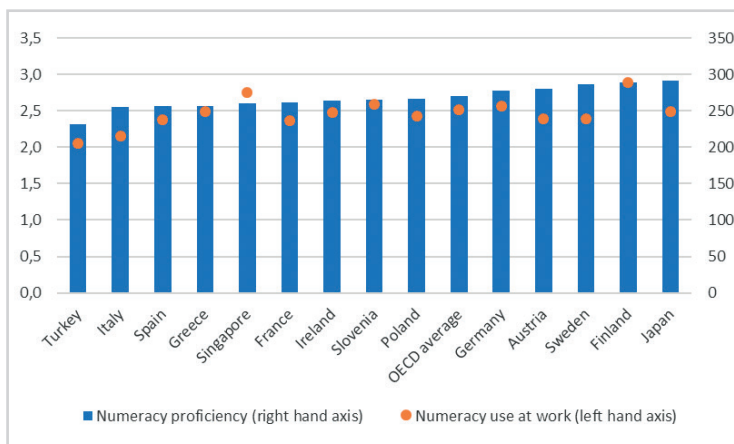


Fig. 4b: Skills use at work and numeracy skills proficiency of the working population
Source: Survey of Adult Skills (PIAAC) (2012, 2015)

Non-economic effects of adult skills

Although employability and earnings are important for the individual's well-being, individuals and policy-makers are aware that non-economic factors also contribute to the welfare of the individual and the functioning of society as a whole.

In this regards, the PIAAC survey collects information about four non-economic effects: the degree of confidence in others; volunteering in religious, political or charitable activities; feeling that they can influence the political process (political effectiveness); and self-assessment of health. These measures are often used as indicators for the measurement of social capital in large economic and sociological literature, which began with the seminal contribution of Robert Putnam (1993) who studied the link between social capital (and cultural specifics) and long-term economic development.

Comparison in Figure 5 shows that literacy and numeracy skills are positively related to trust, volunteering, political effectiveness and self-assessment of health. A relatively strong link between literacy skills and non-economic factors, such as trust in other people and institutions, political effectiveness, volunteer work and self-assessment of health, has been observed both in Slovenia and in OECD countries.

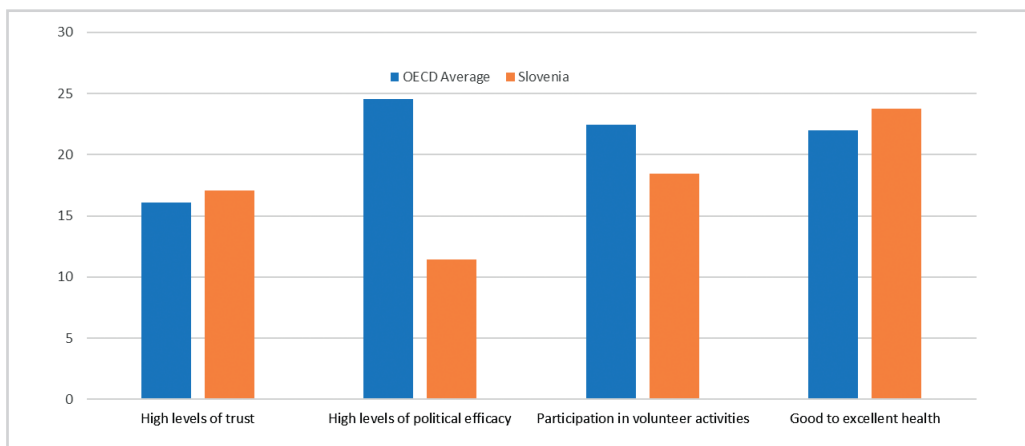


Fig. 5: Literacy proficiency and positive social outcomes

Source: Survey of Adult Skills (PIAAC) (2012, 2015)

In Slovenia, adults with higher achievements in literacy skills (level 4 or 5) report three times more often than adults with achievements at level 1 or below, that they trust others. The difference in social trust between those with high and those with low achievements in literacy skills is on average lower in the OECD countries than in Slovenia. Similarly, adults with high results in Slovenia and in the OECD twice as much as adults with low results believe that they can influence political processes (political effectiveness). Volunteering among adults with very good results in skills is much more common than among adults with poor results.

Individual's own assessment of health is also linked to the management of literacy skills. About 94.4 % of adults in Slovenia who mastered literacy skills very well, said that their state of health is excellent, compared to 70.7 % of adults who have poorly mastered literacy skills. This result coincides with observations in other participating OECD countries, with an average of 90.7 % of adults with very good results and 68.7 % of adults with poor results who reported excellent health status.

Conclusion

Our analysis showed the great importance of literacy and numeracy skills for adults, as well as the great differences that arise among different groups of adults. The analysis has shown relevance of participation in adult education for the development of literacy and numeracy skills, and correlation among these two measures. Other research has already revealed the importance of participation in education for those who are less educated, or those who have left the school system relatively early (e.g. Mirčeva & Radovan, 2014).

Analysis also calls for more attention to the skills of migrants. Their skills are generally low, but not all the migrants are vulnerable. According to the latest OECD analysis

(2018), migrants are an extremely heterogeneous group, which differs according to the level of education, social capital, and also according to the level of literacy and numeracy skills. Language barriers and low education are among the most important indicators of low skills, that will have to be encountered by newcomers in the country (Levels, Dronkers, & Jencks, 2017; OECD, 2018).

Comparisons of measured skills with age have confirmed our assumption and findings of other studies that the level of skills is decaying with age (Desjardins & Warnke, 2012; Green & Riddell, 2013; Muršak & Radovan, 2015; Paccagnella, 2016). In a study done by Muršak and Radovan (2015) has also been shown that participation in non-formal education affects the curve of decline, and this is particularly strong for those with lower education attainment. This means that from a policy perspective, special attention should be paid in terms of content and quality of non-formal education programs for those with lower education.

We also observed relation of skills used at work and the level of literacy and numeracy skill. Our analysis was congruent to other research, that shows that the level of literacy and the use of skills (at work or at home) are mutually complementary (Reder, 2009, 2014). As in their meta-analysis, the authors of Burke and Hutchins (2007) have identified the need to develop a stimulating work environment and increase the complexity of the work for the development of individual types of skills. On the other hand, we can expect that the higher level of economic development and the increase in GDP will consequently also add to the complexity of the work. However, as some studies have shown, only the extent of integration and the amount of education and training is not a sufficient condition for improving the skills of employees, but it is necessary to pay particular attention to the quality and complexity of this education (Muršak & Radovan, 2015).

Lastly, despite the established importance of adult education and training, consideration should also be given to policy measures at the level of the education system as a whole. Considering the large differences in the measured skills regarding the level of education attained, it is necessary to ask ourselves whether it would not be reasonable to extend the compulsory education and thereby reduce the proportion of those who dropout from the system at lower levels of education. Therefore, policy measures should give more emphasis should be placed on educational programs, for the acquisition of formal education, which remains strongest in relation to literacy and numeracy skills.

Measures of change at the level of the non-formal education system should surely concern avoiding such forms of education and training that are focused solely on meeting the immediate needs of work. Instead, more attention should be given to the development of non-formal education and training that is not directly related to work. It's benefits to literacy and numeracy skills development were already empirically confirmed (Muršak & Radovan, 2015).

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KAKO POBOLJŠATI VJEŠTINE PISMENOSTI I RAČUNANJA ODRASLIH? REZULTATI MEĐUNARODNOG ISTRAŽIVANJA PIAAC

Marko Radovan

Faculty of Arts, University of Ljubljana

marko.radovan@ff.uni-lj.si

Sažetak

U ovom se radu bavimo utjecajem vještina pismenosti i računanja odraslih. Prvo ispitujuemo kako su te vještine vrijedne za odrasle u njihovom radnom i privatnom životu. To činimo dokazom iz međunarodnog studija „Program za međunarodnu procjenu sposobnosti za odrasle – PIAAC“ (OECD, 2016). Međunarodna analiza pokazuje da je razina sposobnosti koju mjeri PIAAC u većini OECD zemalja relativno niska. To je alarmantno jer podaci PIAAC-a pokazuju da razina vještina čitanja i računanja ima značajan utjecaj na mogućnosti daljnjeg obrazovanja i zapošljavanja. Razina vještine je također snažno povezana sa stupnjem obrazovanja i smanjenjem tijekom godina. U članku se uglavnom bavimo pitanjem kako se odrasle osobe s niskom sposobnosti pismenosti i računanja koriste svojim vještinama i kako se to odražava u njihovom sudjelovanju u učenju.

Ključne riječi: *pismenost, računanje, vještine odraslih, PIAAC, sudjelovanje u obrazovanju odraslih*