Building the Right Skills for Human Capital: Education, Skills, and Productivity in the Kyrgyz Republic

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## Contents

**Executive Summary** .................................................................................................................................................. 4

**Chapter 1 Setting the Context: The Labor Market, Education, and Skills Development Today** .................................................................................................................................................. 11

- Structural Changes in the Labor Market.................................................................................................................. 11
- Technological Disruptions ....................................................................................................................................... 13
- Education and Skills ............................................................................................................................................... 14

**Chapter 2 Survey and Data Collection** .................................................................................................................. 19

- Description of Survey ............................................................................................................................................... 19
- Data Collection Methodology .................................................................................................................................. 19

**Chapter 3 Defining the Challenge: Proficiency of Literacy Skills, Numeracy Skills, and Problem-Solving Skills in Technology Rich Environments** .................................................................................................................. 23

- Measurement of Skills ............................................................................................................................................... 23
- Proficiency of Skills ................................................................................................................................................ 25
- Socio-demographic Characteristics and Skills ........................................................................................................ 34
- Skills Proficiency of Teachers ................................................................................................................................ 43
- Career Interests and Behavioral Competencies ..................................................................................................... 50

**Chapter 4 Use of Skills in the Workplace** .............................................................................................................. 57

- Use of Skills in the Workplace ................................................................................................................................ 57
- Skills (Mis-)Match .................................................................................................................................................. 59
- Education, Skills, and Earnings ............................................................................................................................... 67

**Chapter 5 Building Skills for the Future** ................................................................................................................ 71

- Generating New Insights on Skills in Kyrgyz Republic ............................................................................................ 71
- From Evidence to Policy ........................................................................................................................................... 75

**References** ............................................................................................................................................................... 81

**Appendices** ............................................................................................................................................................... 83

- Appendix A. Ordinary Least Square Model on the Determinants of Wages in Kyrgyz. 83
- Appendix B. Description of Literacy Proficiency Levels .......................................................................................... 84
- Appendix C. Description of Numeracy Proficiency Levels ....................................................................................... 85
Executive Summary

As a budding democracy and a demographically young nation, the Kyrgyz Republic is seeking today a trajectory of sustainable growth that is less dependent on remittances, natural resources, and a large informal economy. Raising human capital can build a skilled and enterprising workforce, allowing it to reap the dividends of a youth bulge, be resilient to disruptive technology, and help it create quality formal economy jobs for its large and fast-growing young population.

A changing demand for skills can be seen across the world in the 21st century. In some instances, technology can disrupt labor markets, altering the manner in which businesses and consumers operate and interact. Technological advancements also provide significant opportunities to create new jobs and enhance productivity and effectiveness. The changing landscape for technological innovation translates to a required change in education and skills within the marketplace. While this shift is slower in Kyrgyz Republic than in some other Europe and Central Asian countries, Kyrgyz Republic is no exception. Through implementation of the National Sustainable Development Strategy (2018-2023), Kyrgyz is planning for technological innovation. Such innovation requires a skilled workforce.

In the Kyrgyz Republic, the global trends and technological disruption intersect demographic growth and structural economic challenges. School age children account for more than 30 percent of the country’s population, which is generating increasing demand for access to quality preschool and basic education. This will translate into increased demand for post-secondary and tertiary education to produce workers with the relevant skills for the changing nature of the workplace. While it is a major challenge to meet this demand with quality education that builds the necessary skills, the young population of the Kyrgyz Republic also provides an opportunity. If Kyrgyz succeeds in raising the quality of education, it will upskill a large part of the labor force - all those young people that will enter the labor market - in a relatively short period of time.

While the industrial sector largely collapsed after transition, it has experienced a revival in the last few years with the garment industry and private enterprises expanding. The agriculture sector became the dominant sector in the 1990s, and more recently agriculture has been replaced by the service sector. In 2018, the service sector
accounted for approximately 50 percent of GDP, as compared to 28 percent for the industry sector and 12 percent for agriculture (Statista, 2020). These sectoral shifts have also been accompanied by a greater demand for “new skills” – higher order analytical skills, as evidenced also by an analysis of Kyrgyz Household Budget Surveys.

**In the Kyrgyz Republic, job creation is slow and behind the pace of demographic growth** (Ajwad and Gonzalez, 2018). While the service sector has expanded, firm and worker productivity remain the lowest in the region. Firms increasingly attempt to turn to technology for solutions. Wide disparities in access to jobs among youth and women exacerbate this challenge. The need for shifting to a new model to stimulate and sustain stronger growth is becoming an economic and social imperative.

**The demand for skills puts pressures on the education system to produce the right skills and quantity of skills.** The changing demand for skills and jobs is a race between education and technology and the need to build evidence to inform policy and investment in human capital formation.

**While the challenges are large, in the past decade, the Kyrgyz education system has made some incremental gains in student learning outcomes.** The 2017 Early Grade Reading Assessment (EGRA) found a 10 percent improvement in scores for second graders and a 13 percent increase in scores for fourth graders over the 2014 results. Albeit improving, still only 44 percent of sampled second graders and 47 percent of sampled fourth graders attained grade-level oral reading fluency. The National Sample-based Assessments (NSBA) showed similar improvements and concerns, with increased results for 4th and 8th grade students in 2017 compared with 2014, but with gaps in learning achievement. Results in PISA 2009 also portrayed this gap, indicating that 15-year-old students trail behind the OECD average by approximately 4.5 grade levels (World Bank, 2020). These assessments provide an important entry into understanding some of the challenges in skill acquisition.

**The 2019 skills survey for the adult Kyrgyz population provides us with a better understanding of the relationship between skills acquisition and education.** The skills measures used in this survey focus on literacy, numeracy, and problem solving in
technology rich environments (PSTRE) and followed the same questions and approach as the OECD’s PIAAC surveys. The report explores the key cognitive and workplace skills needed for individuals to participate in society and for economies to prosper and provides a baseline data set on the levels and proficiency of education and skills of a representative sample of Kyrgyz youth and adults.

*The key messages of the report are highlighted below:*

**The labor market is increasingly seeking adults with strong foundational skills, however, a large portion of adults in the Kyrgyz Republic perform well below this foundational level.**

Most jobs in the Kyrgyz Republic require regular use of reading, writing, numeracy, and ICT skills, and higher skilled groups of people earn higher wages, suggesting that the labor market rewards higher skills. However, skills levels among the workforce are consistently low in absolute levels, among varying socio-demographic groups, and relative to countries that implemented PIAAC surveys. Literacy and numeracy skills of younger adults do not appear to be significantly stronger than older cohorts. Skill levels are measured on scale of “below level 1” through “level 3 and above.” Level 2 is considered the minimal proficiency for literacy and numeracy. PSTRE measures problem-solving skills in connection with basic computer literacy. A level 1 PSTRE score indicates basic understanding, simple forms of reasoning, and use of common ICT applications, while a score of 2 or above demonstrates inferential reasoning integrated tasks and use of specific technology applications.

*A significant share of the adults in Kyrgyz Republic performed at or below level 1 in literacy and numeracy.* In literacy, 59% of adults scored at or below level one, and in numeracy 60% did. Among those who scored higher, about three quarters performed at level 2. Altogether, only about 10% performed at level 3 or higher. In practice this means that in literacy, the majority of the adult population has, at best, knowledge of and is able to recognize “basic vocabulary, determining the meaning of sentences, and reading paragraphs of [relatively short digital or print] texts”, while in numeracy the majority of the population is, at best, able to engage in “simple processes involving counting; sorting; performing basic arithmetic operations; and identifying elements of simple or common
graphical or spatial representations”. In comparison, only 19% of adults in OECD countries and 22% of adults in ECA countries score at or below level one on literacy, with corresponding numeracy rates being 24% (OECD) and 25% (ECA).

**PSTRE skills do not meet the needs of the 21st century.** Ninety-eight percent of respondents have at most, level 1 PSTRE proficiency (see Figure 3.7), which means that respondents only have basic skills to *use of widely available and familiar technology applications, such as e-mail software or a web browser. There is little or no navigation required to access the information or commands required to solve the problem. [...]”* (OECD, 2016b)

**Completion of upper secondary does not equate to significantly improved skill levels.** While some improvement in skills exists between those who have and have not completed upper secondary, the impact is relatively small in comparison to international norms. In literacy, 65% of those with upper secondary perform at level 1 or below compared to 71% of those with less than upper secondary compared with. In numeracy, these figures are, respectively 66% and 77%. Overall, two-thirds of upper secondary respondents do not have basic literacy and numeracy skills.

**Tertiary education is associated with higher skill levels, but skill levels remain low and vary significantly.** In literacy, those scoring at or below level 1 fall from 65% percent of upper secondary respondents to 42% of tertiary respondents. A similar decline is seen in numeracy, with 66% of respondents with upper secondary scoring at or below level 1 compared to 42% of tertiary respondents. While this improvement in skills is significant, a meaningful ratio of tertiary students does not have basic literacy and numeracy skills (2:5).

**Skills do not vary significantly between the employed and unemployed.** Recall that whether a respondent was employed or not was only available on the Russian sample of the survey. In that sample, 55% of employed respondents performed at or below level one in literacy, compared to 57% of unemployed respondents. Numeracy results were similar with 54% of employed respondents scored at or below level 1 in numeracy compared to
59% of unemployed respondents. The unemployed scored slightly higher on PSTRE skills than the employed (6% unemployed scored at level 2 compared to 2% of employed).

**While results do not improve across age cohorts in numeracy and literacy, PSTRE skills show improvement across cohorts.** A comparison of literacy and numeracy performance across age cohorts indicates that the low performance is relatively consistent and is not consistently improving with more recently educated adults. The same comparison of age cohorts for PSTRE skills demonstrate steady improvement across age cohorts with 33% of 16-24 years scoring below level 1 compared to 63% of 55-65-year old.

**There is evidence that a substantial share of people is over-schooled, but under-skilled.** Over-/under education refers to a situation where a worker possesses a higher (lower) level of education than the occupation is expected to need, while over-/under skilling describes a situation where a worker possesses more (fewer) skills than the job requires, regardless of education level. The analysis finds that 32% of respondents had education levels that were higher than their particular occupation is expected to require, but when it comes to actual skills, under-skilling is much more prevalent than over-skilling, with 36% of respondents under skilled in writing and 54% of workers being under-skilled in PSTRE. Reassuringly, the analysis does find that higher skilled groups of people earn higher wages, suggesting that the labor market rewards higher skills.

**Overall, the quality of education is an important driver for low skills performance.** The significant variation in skills within education levels creates a potential mismatch between acquired skills and required skills in the marketplace. The high usage of skills suggests an opportunity for upskilling on the job. The report concludes with a series of policy recommendations at different levels of education, from early-childhood education through life-long learning, including providing upskilling opportunities for those teachers with specific skill deficiencies.

*The key recommendations include:*
**Recommendation 1: Address learning outcomes.** Focusing on quality begins with early childhood education (3-6 years old). Standards for effective practices in child development should be implemented to ensure the building of foundational skills and readiness to learn. A focus on quality includes enhancing the learning of basic cognitive and non-cognitive skills for students aged 7 to 19 years old. A large portion of the curriculum currently uses memorization of facts and multiple-choice responses to acquire and test knowledge. Competency-based assessments, which center on higher level skills of understanding, critical thinking, and application of knowledge, will help students integrate the knowledge they learn with problems they will be asked to address in the future marketplace.

**Recommendation 2: Make post-secondary and tertiary education labor market relevant.** While important to continue increasing enrollment at the post-secondary and tertiary level (16-22-year old) in Kyrgyz Republic, this has less impact if the quality of education does not address the needs of society. Post-secondary and tertiary education need to include a focus on intermediate literacy, numeracy and PSTRE skills.

**Recommendation 3: Invest in teachers’ professional development.** The quality of education is only as strong as its teachers. The findings in this report indicate an opportunity to improve the quality of education by providing upskilling opportunities for teachers with specific skill deficiencies, focusing first on teachers with only basic literacy and numeracy skills.

**Recommendation 4: Enhance skills throughout one’s life.** Skills can be maintained and grown in the workplace. Basic and advanced skills may be developed on the job that can supplement one’s education. This is particularly valuable for individuals who learn better by practice and can help to sustain not only the entry level labor market, but aid in creating a strongly skilled workforce overall.

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While this report was being prepared, the COVID-19 pandemic broke out across 200 countries/territories, including Kyrgyz Republic. Consequently, social distancing measures were taken by the Kyrgyz government and routine schooling and education delivery system were disrupted. The government launched a distance learning program to keep continuity of education through TV and radio broadcast of video-taped lessons and make online resources accessible for teachers and students. The school system remains closed through the rest of the 2019-2020 school year.

The pandemic and its negative impact on schooling are likely to cause considerable loss of learning, which will further exacerbate the deficiencies of skill proficiency found in this study. These deficiencies are likely to affect not only today’s students in school in the short-term, but also the skill proficiency of the future workforce and adults over the long run. The COVID-19 crisis risks increasing the existing learning gap demonstrated by the PISA 2009 data by losing a further half of a year of schooling. There is an educational and economic imperative to adopt relevant policy and investment to ramp up mitigation efforts for minimizing the loss, facilitating the recovery, building the system resilience to sustain learning, and building the right skills needed for a productive workforce, changing workplace, and a sustainable economy.
Chapter 1 Setting the Context: The Labor Market, Education, and Skills Development Today

Since independence in 1991, the Kyrgyz Republic has been characterized by a liberal political regime, passing economic and political reforms intended to support long-term economic growth. These reforms have resulted in modest declines in poverty and have been coupled with a steady increase in population and life expectancy.

Between 2000 and 2016, the economy grew at an average annual rate of 4.5 percent, largely driven by gold extraction and migrant remittances from workers abroad. Nearly a quarter of the population live below the international poverty line of US$ 3.2 per capita per day, with a still larger proportion of households clustered just above the poverty line and therefore vulnerable to small shocks.

The population has increased from 5.3 million in 2008 to 6.3 million in 2018. Almost 35 percent of the population is under the age of 15. In the last 10 years, life expectancy has also increased from 68 to 71 years. The annual population growth rate of 2.1 will have a significant impact on the labor force in the coming years (World Bank, 2019).

The Kyrgyz Republic has a Human Capital Index of 0.58, meaning a Kyrgyz child born today will be 58 percent as productive when she grows up as she could be if she enjoyed complete education and was fully healthy (World Bank, 2018). Given the large percentage of the population under 30, the country has a tremendous opportunity to boost its human capital.

Structural Changes in the Labor Market

In the 21st century, Kyrgyz Republic has experienced a structural shift with employment in the agricultural and mining sectors declining and jobs in the industry and service sectors increasing. In 2018, 55% of workers were employed in the service sector, 20% in agriculture, and 25% in industry (ILOSTAT, 2020). The country’s remittance economy helps to account for the large service sector, as remittances are the largest source of foreign
exchange in the country, with almost one-third of the Kyrgyz labor force employed abroad (Asian Development Bank, 2019). Meanwhile the decline in traditional sectors disproportionately affects the two-thirds of the population who live in rural areas (Ajwad, et. al, 2014).

The 2018 World Bank Jobs Report on Kyrgyz Republic highlighted four challenges for the Kyrgyz labor market: job creation, productivity, quality, and inclusion. Job creation is currently not keeping pace with population growth. Each year an estimated 50,000 individuals enter the labor market. By 2030, an estimated 4.6 million adults will be of working age. However, while the workforce is growing by an estimated 2 percent per annum, job creation averaged 0.9 percent between 2009 and 2013. While wages have increased significantly, growth in labor productivity is relatively low for the region at 4.3 percent per annum. Increased informality in the service and industry sectors contribute to low productivity growth (World Bank, 2015; Ajwad and Gonzalez, 2018).

Job quality is also a concern for further economic growth. Less than one-third of workers are employed in the formal sector. Of those in the formal sector, 60 percent are employed in the public sector. Formal, private sector employment is limited to a few sectors and is highly concentrated in urban areas. The labor market, therefore, consists of high rates of informality, as well as temporary, occasional and seasonal work. Overall, the informal sector accounts for an estimated 20 percent of GDP.

Job inclusivity is also an important challenge for Kyrgyz Republic. One-third of working age adults are not in the workforce. In 2018, 74% of men were active in the labor force. This is significantly higher than labor participation rates for women, which sit at approximately 44 percent, and for youth, which are approximately 38 percent (ILOSTAT, 2020). While youth and women are the largest groups of potential workers, many are prevented from entering the labor force due to social norms and structural constraints. Moreover, jobs tend to be regionally concentrated, with workers in Bishkek and Jalal-Abad more likely to have regularly paid employment, 66 percent and 53 percent of workers, compared to 35 percent of workers in other regions (Ajwad and Gonzalez, 2018).
Overall, these challenges can be addressed through a combination of job growth, skilled labor force development, and labor equilibrating policies. This study follows up on that report by assessing the stock of the foundational skills of the current workforce to close the gaps of evidence about how to build a skilled and productive workforce.

**Technological Disruptions**

A changing demand for skills can be seen across the world with the rise in artificial intelligence, robots, and big data. In some instances, technology can disrupt labor markets, altering the manner in which businesses and consumers operate and interact. Technological advancements also provide significant opportunities to create new jobs and enhance productivity and effectiveness. The changing landscape for technological innovation translates to a required change in education and skills within the marketplace, and motivates this study. While this shift is slower in Kyrgyz Republic than in some other Europe and Central Asian countries, Kyrgyz Republic is no exception. The government currently is pursuing an initiative, Taza Koom, to digitize the infrastructure, government, society and economy of the nation (UNDP, 2018). Taza Koom’s success will require a technologically savvy workforce.

Worker productivity in Kyrgyz Republic is currently the lowest in the region, and firms are increasingly turning to technology to address their problems. The labor market is starting to require solutions that assume workers have technological skills. With one-third of the population under 15, the school system could begin to address technological disruptions in a meaningful manner. Individuals can acquire the 21st century skills required to create needed solutions only if the education system can aid in solidifying their skillset. In order to ensure that workers have the technological skills that will be required, a significant shift in skill acquisition will be necessary.
Education and Skills

Given economic shifts within the country, a mismatch between worker skills and employer needs exists. Firms increasingly require higher-level skills that employees may not be receiving in their education. While overall enrollment rates are high at the primary and secondary levels, early childhood education remains low, and learning levels do not correspond with years of education.

Kyrgyz Republic enjoys near universal enrollment rates for Grades 1-9, with no disparity between girls and boys. Disparities remain low, but enrollment rates decline in upper secondary with just over half of upper secondary aged children enrolled in upper secondary in 2018: 52% of boys and 53% of girls (UNESCO, 2020). Tertiary education follows a similar pattern with near gender parity, but with net enrollment rates of approximately 41% (UNESCO, 2020).

Education completion rates have been on the rise, as evidenced by comparing younger with older cohorts. Among 25-34-year-old, more than a third has completed tertiary education.

Figure 1.1: Education completion by cohort

Source: Calculations based on 2018 Kyrgyz Integrated Budget and Labor Force Survey (KIHS)
Alongside improvements in net enrollment at the primary and secondary levels, participation in early childhood development programs has quickly increased too, although still remain out of reach for many. Enrollment for three to six-year-olds in early childhood education more than tripled from 12 percent in 2007 to 39 percent in 2018 (UNESCO, 2020). Enrollment rates in urban areas are roughly twice those of rural areas. Bishkek and Osh have substantially higher enrollment rates than other oblasts, and the wealthiest quintile of households have a 50 percent enrollment rate compared to 12 percent for the poorest quintile (Ministry of Education and Science, 2018b; World Bank, 2018). The main constraint for early childhood education remains the lack of supply, particularly in rural areas.

The rise in early childhood education is likely a positive development toward raising skill levels. For example, students who received more than one year of pre-primary education performed better on the 2009 PISA tests than those who did not. Students who did not attend pre-primary scored 38 points lower in math, 36 points lower in science, and 45 points lower in reading than students who attended at least one year of pre-primary. Moreover, similar performance in skills testing between youth and older workers suggests students are not advancing skills from one generation to another (World Bank, 2019).

The country has made notable strides in addressing access to education. The next important aspect in ensuring skill acquisition is the quality of education. The 2017 Early Grade Reading Assessment (EGRA) found that only 44 percent of sampled second graders and 47 percent of sampled fourth graders attained grade-level oral reading fluency. This represented an important gain over the 2014 results (10/13 percent respectively), but also demonstrates a need to continue to focus on skill acquisition from an early age. The 2009 PISA results provided further evidence of this gap in skill acquisition with 15-year olds lagging approximately 4.5 grade levels behind the OECD average (World Bank, 2020). Republic.

Overall, the World Bank’s Human Capital Index, launched in 2018, calculated a learning gap in Kyrgyz Republic of 4.2 years, indicating that the average 12.6 years of schooling
equated to 8.4 years when adjusted for quality of learning (World Bank, 2019). These results indicate the need for an increased focus on effective and efficient learning, underscoring the need to continue to improve the education system in order to ensure youth are acquiring the skills necessary for a highly productive society.

The need to ensure quality education extends to the role that Technical and Vocational Education and Training (TVET) plays within the country. A recent examination of trends and challenges in TVET in one region of the country found that occupational training options do not coincide with the needs of the labor market (ILO, 2020). Ensuring that TVET can adapt quickly as the market changes is key to its success and the success of industries in Kyrgyz Republic. The findings in this report underscore the need to ensure a focus in TVET on problem solving skills in general and in technology rich environments in particular, where very few adults score beyond the most basic level.

The 2019 World Development Report (WDR) argues that minimal data exists to understand whether human capital is being created through education systems, which obstructs the design and implementation of solutions. This report seeks to build evidence to inform the Government’s education sector policy and investment priorities for human capital development. In this manner, it addresses the gap identified by the WDR, examining the current state of human capital in Kyrgyz Republic and provides recommendations to ensure a growing economy on the way to a Sustainable 2040, as laid out in the National Sustainable Development Strategy (2018-2023).

Given that higher skilled groups of people earn higher wages in Kyrgyz Republic, and that most jobs require regular use of reading, writing, numeracy, and ICT skills, this report uses a skills survey focusing on literacy, numeracy, and problem solving in technology rich environments (PSTRE) to examine skills levels of adults. The survey finds that skills levels among the workforce are consistently low in absolute levels, among varying socio-demographic groups, across age groups, and relative to countries that implemented PIAAC surveys.
The results show that in literacy, the majority of the adult population (59%), at best, has knowledge of and is able to recognize “basic vocabulary, determining the meaning of sentences, and reading paragraphs of [relatively short digital or print] texts”, while in numeracy the majority of the population (60%), at best, is able to engage in “simple processes involving counting; sorting; performing basic arithmetic operations; and identifying elements of simple or common graphical or spatial representations.” In comparison, only 19% of adults in OECD countries and 22% of adults in ECA countries score at this level in literacy, with corresponding numeracy rates being 24% (OECD) and 25% (ECA). Similarly, the report finds that 98% of respondents only have basic skills to use widely available and familiar technology applications, such as e-mail software or a web browser. There is little or no navigation required to access the information or commands required to solve the problem. […]” (OECD, 2016b)

Higher levels of education are associated with higher skills levels. However, even among the most educated, a large share has low skills scores. While some improvement in skills exists between those who have and have not completed upper secondary, the impact is relatively small in comparison to international norms. Overall, two-thirds of upper secondary respondents do not have basic literacy and numeracy skills. While tertiary education is associated with higher skill levels, skill levels remain low and vary significantly. Two out of five tertiary students do not have basic literacy and numeracy skills.

There is evidence that a substantial share of people is over-schooled, but under-skilled. Over-/under education refers to a situation where a worker possesses a higher (lower) level of education than the occupation is expected to need, while over-/under skilling describes a situation where a worker possesses more (fewer) skills than the job requires, regardless of education level. Reassuringly, the analysis does find that higher skilled groups of people earn higher wages, suggesting that the labor market rewards higher skills.

Overall, we find that the quality of education is likely an important driver for low skills performance; the significant variation in skills within education levels creates a potential
mismatch between acquired skills and required skills in the marketplace; and the high usage of skills suggest an opportunity for upskilling on the job. Moving forward, Chapter 2 explains the data and methodology used in the report; Chapter 3 examines proficiency of literacy, numeracy, and problem-solving skills in technology rich environments, Chapter 4 explores the correlation between these skills and their use in the workplace, and Chapter 5 provides expanded lessons learned and policy recommendations.
Chapter 2 Survey and Data Collection

Description of Survey

To better understand key skill proficiencies of the adult population in the Kyrgyz Republic, including distributional aspects, key drivers, and use of these in the labor market, a survey was conducted focusing on proficiency in literacy, numeracy, and problem solving in technology-rich environments (applying ICT skills to solve problems). These skills are coined “key information-processing skills” (OECD, 2013a, p.94), as they are considered:

- Necessary for fully integrating and participating in the labor market, education and training, and civic life
- Highly transferable, in that they are relevant to many social contexts and work situations
- “Learnable” and, therefore, subject to the influence of policy (OECD, 2016b, p34).

These skills act as the foundation for building higher order cognitive skills and are important across the life cycle. OECD has found that adults who are highly competent in these skills are more likely to adapt positively to changes in the modern economy. In addition, the survey collects a range of related information such as use of the skills at work, use of computers, and whether their skills and qualifications match work requirements, among others.

Data Collection Methodology

The survey that was conducted used Education & Skills Online, an online version of as the OECD Programme for the International Assessment of Adult Competencies (PIAAC). The survey was conducted by the World Bank with guidance from the OECD PIACC team. The test and data collection were administered by the National Testing Center of the Ministry of Education & Science of the Kyrgyz Republic.

The data were collected over two waves, starting with a first round in November-December 2018 where 398 people were interviewed as part of a pilot phase. The survey
implementation during the pilot phase proved successful and was followed by a second round in February-April 2019 where the remainder people were interviewed.

The final sample consisted of 2,634 adults ages 16-64 years old, broken down across three distinct and separate sub-samples: a nationally representative random population-based sample of 1,770 adults, a random sample of 399 high school teachers, and a random sample of 413 people who participated in the 2009 PISA survey. The analysis in this report focuses on the first two samples.

The State Registration Service of the Kyrgyz Republic provided a list of all households in all territories of the Kyrgyz Republic. For example, in the city of Naryn, according to the Database, there are 11,395 households. The State Registration Service also provided with an online map of all households. Households were selected from this database using the method of equiprobation.

The first stage selection units (FSU) was Rural districts and cities. The selection of FSUs in the strata was carried out by PPS (Selection with probability proportional to size) method. Inside the household, the respondent was collected using a Kish card.

A second important consideration is the language of the survey. The survey included skills tests, for example to assess literacy. After having answered the background questionnaire, the respondent completed the skills test either on a laptop computer or by completing a paper version using printed test booklets, depending on their computer skills. Respondents could take as much, or as little time as needed to complete the assessment. Respondents were free to select one of two options for the language of the test: Kyrgyz or Russian. If Russian language was selected, respondents were asked the full set of questions: a literacy-, numeracy-, and problem solving in technology-rich environments (PSTRE) test, as well as modules on, for example, skills use in the workplace. However, if the Kyrgyz language test option was used, respondents only carried out the (same) literacy test as the Russian language test takers. They did not take the other tests or were asked the skills use questions.

1 “Key facts about the survey of adult skills (PIAAC) (OECD, pg 2, undated)
The Russian language sub-sample consist of 1,094 respondents, broken down across the three subsamples as follows: 577 for the population sample, 323 for the teacher sample, and 159 for the PISA 2009 sample. The corresponding figures for the Kyrgyz language these figures are, respectively: 1,540 respondents for the entire subsample, broken down into 1,193 (population), 76 (teachers), and 254 (PISA 2009).

When presenting results in the chapters that follow, unless otherwise reported: literacy results are based on the full sample, while for numeracy we imputed values for the Kyrgyz sample. This imputation was done by taking the Russian language subsamples, and predicting numeracy test results, respectively, using as predictor variables literacy, age, gender, immigrant, education levels, and teacher sample (population, teacher, PISA 2009). See Appendix A for the model results. Because much of the analysis that follows reports differences in levels results (generally 4 levels), where levels are determined using specific cut-off values for the raw scores on the specific tests (with a lower cut-off value for a lower level), the imputation was also done for levels using ordered probit estimations.

To assess the accuracy of our predictions, we compare actual versus the levels predicted by the model in the Russian sample where we can observe both. The largest difference is small, only 6 percentage points for numeracy level 2 as shown in the table below.

**Table 2.1 Numeracy actual and predicted levels, Russian language sample**

<table>
<thead>
<tr>
<th>Level</th>
<th>Observed</th>
<th>Predicted</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Level 1</td>
<td>11</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Level 1</td>
<td>28</td>
<td>24</td>
<td>3</td>
</tr>
<tr>
<td>Level 2</td>
<td>40</td>
<td>46</td>
<td>-6</td>
</tr>
<tr>
<td>Level 3/4/5</td>
<td>21</td>
<td>20</td>
<td>1</td>
</tr>
</tbody>
</table>

When presenting results from survey modules done only by the Russian language respondents, for example, information on occupation and skills use at the work place, it
should be kept in mind that this group is a selected group; literacy test results among this group are considerably higher than among the Kyrgyz language group.
Chapter 3 Defining the Challenge: Proficiency of Literacy Skills, Numeracy Skills, and Problem-Solving Skills in Technology Rich Environments

This chapter seeks to understand the status of literacy, numeracy, and problem-solving skills in technology rich environments (PSTRE) in Kyrgyz Republic as measured in the 2019 survey that follows the PIAAC methodology. Specifically, this chapter examines how skills are measured and reports the results on skill levels of respondents. Skill levels are further disaggregated by level of education, gender, location, employment, and immigration status.

Measurement of Skills

Literacy
For the purposes of this survey, literacy is defined as “the ability to understand, evaluate, use and engage with written texts in order to participate in society, achieve one’s goals, and develop one’s knowledge and potential. In the survey, the term “literacy” refers to reading written texts; it does not involve either comprehending or producing spoken language or producing text (writing)” (OECD, 2016b, :38). Literacy questions in the survey addressed word recognition, sentence processing, and passage comprehension.

Scoring of literacy proficiency is on a six-level scale, again following the same method as the PIAAC: below level one and levels one to five (see Appendix B for description of tasks associated with each level). Given the relatively low number of individuals who scored at levels 4 and 5 (23 in the Russian sample), the levels reported in this report were collapsed into four: below level one, one, two, and three and above. In this report, below or at level one is considered to be not proficient, level two is considered proficient, and level three or above is considered highly proficient.
**Numeracy**
Within the survey, numeracy is defined as “the ability to access, use, interpret and communicate mathematical information and ideas in order to engage in and manage the mathematical demands of a range of situations in adult life. A numerate adult is one who responds appropriately to mathematical content, information and ideas represented in various ways in order to manage situations and solve problems in a real-life context” (OECD, 2016b, :48).

Following the PIAAC method, scoring of numeracy proficiency is also on a six-level scale: below level 1 and levels one to five (See Appendix C for detailed tasks associated with each level). As with the literacy levels, the levels in this report for numeracy were collapsed into four: below level one, one, two, and three and above. This report considers respondents scoring below level two are considered to have a low level of proficiency, respondents scoring at level two are considered to possess numeracy proficiency, and respondents scoring at or above level three are considered to have high numeracy proficiency.

**Problem Solving in Technology-Rich Environments (PSTRE)**
PSTRE assessment focuses on “the abilities to solve problems for personal, work, and civic purposes by setting up appropriate goals and plans and accessing and making use of information through computers and computer networks” (OECD, 2016b, 53). PSTRE is designed to examine cognitive skills required for problem-solving combined with computer literacy to determine respondents’ ability to assess, evaluate, and adapt while using computer tools and applications. For those who qualified to take the PSTRE portion of the survey, skills were assessed on a four-level scale: below level one, level one, level two, and level three. It is important to note that this module was only available to respondents taking the survey in Russian.
Proficiency of Skills

A basic skills challenge exists within the country. Respondents generally scored at a low level of proficiency on literacy, numeracy, and PSTRE tests, with great variation within and across cohorts. Scoring at level 2 is considered basic proficiency of a skill. The majority of respondents do not possess basic proficiency in literacy, numeracy, or PSTRE skills. This section will examine the overall results on the tests and how these results compare to other countries.

Literacy and Numeracy

Respondents consistently scored below basic levels with 59% of adults scoring at or below level one in literacy, and 60% scoring at or below level 1 in numeracy (Figure 3.1). Among those who scored higher, about three quarters performed at level 2. Altogether, only about 10% performed at level 3 or higher.
In literacy, these results indicate that the majority of the adult population has, at best, knowledge of and is able to recognize “basic vocabulary, determining the meaning of sentences, and reading paragraphs of [relatively short digital or print] texts”, which correspond to Level 1. In numeracy, Level 1 corresponds to “simple process processes involving counting; sorting; performing basic arithmetic operations; and identifying elements of simple or common graphical or spatial representations.”

In comparison, only 19% of adults in OECD countries and 22% of adults in ECA countries score at or below level one on literacy as shown below in Figure 3.2.

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2 For details, see OECD (undated, page 3): “Key facts about the survey of adult skills (PIAAC).”

3 Idem.
Estimated levels for numeracy are almost identical to literacy with 60 percent of Kyrgyz adults scoring at or below level 1. Similarly, international comparisons on numeracy find that 24% of adults across OECD countries and 25% of adults in ECA countries score at or below level one on numeracy as shown below in Figure 3.3.

Finally, as in other countries, Kyrgyz who score high (low) on literacy are also very likely to score high (low) on numeracy. This is shown in Figure 3.4.

**Figure 3.4 High Correlation between Literacy and Numeracy Skills**

A comparison of literacy and numeracy performance across age cohorts indicates that the low performance is relatively consistent and is not steadily improving with more recently educated adults. (Figure 3.5). While the skill level of youth is higher than that of older workers, the difference is not very large. Among 16-24-year olds, 54% have a low performance in literacy compared with between 59% and 61% among each of the older cohorts. In numeracy, the results are actually *worse* among the younger cohort: 65% compared with 60% scored at or below level 1.

Internationally, the lack of improvement across cohorts in literacy is also small compared to other countries. For ECA as a whole, there are nine percentage points more older workers (55-65 years old) who are not proficient (scoring at or below one) than young workers (24-35 years old), while in Kyrgyz Republic there is only a two-percentage point difference between younger and older workers.

Figure 3.6 Difference in Percentage of Low Achievers in Literacy (scoring at or below level 1) 25-34-year olds minus 55-65-year olds

That younger cohorts do not perform better on literacy and numeracy is surprising in light of the higher educational attainment by younger cohorts reported in Chapter 1. Recall that tertiary completion rates have been steadily rising when comparing the cohort currently 45-54-year-old with the younger cohorts. This rise in tertiary education might not translate into higher skill outcomes if younger tertiary graduates score lower on literacy and numeracy than older tertiary graduates. Figure 3.7 focuses on tertiary graduates and provides some supporting evidence for this hypothesis. For both literacy and numeracy, the figure shows that among the younger cohort (25-34) with tertiary, there is a considerably larger share performing poorly (below level 1) and a smaller share performing well (level 3 or more) than among the older cohorts with tertiary.

**Figure 3.7: Literacy (left) and Numeracy (right) by cohort for those with tertiary**
PSTRE

PSTRE is designed to examine cognitive skills required for problem-solving combined with computer literacy to determine respondents’ ability to assess, evaluate, and adapt while using computer tools and applications. Problem solving skills in technology rich environments are becoming increasingly important when computers replace routine tasks using automation.

In the current survey, the sample who took the PSTRE test is a relatively selective and proficient sample, as this test was limited to Russian language takers only, which generally scored higher on the literacy test than Kyrgyz language test takers. Second, among the Russian language takers who were offered the test, only 71% actually took the test. The remaining 29% did not take the test (“test not applicable”) because they either have no computer experience at all, lack the most basic ICT skills such as using a computer mouse, or simply opted out. These ‘not applicable’ figures are similar for ECA (28%) and the OECD (28%).

The results from the PSTRE show that 34% of the Russian language sample have low proficiency (Figure 3.8): below level 1, which is considered the minimum requirement to address problem solving tasks in daily life (OECD, 2013, p. 21).

**Figure 3.8 Rate of Problem Solving in Technology Rich Environments (PSTRE)**

Note: Russian language sample only.
At level 1:

“tasks typically require the use of widely available and familiar technology applications, such as e-mail software or a web browser. There is little or no navigation required to access the information or commands required to solve the problem. The tasks involve few steps and a minimal number of operators. Only simple forms of reasoning, such as assigning items to categories, are required; there is no need to contrast or integrate information” (OECD, undated, p. 4).

While many countries have a high share of the adult population with low proficiency on PSTRE skills, this share is considerably higher in the Kyrgyz Republic. This is shown in Figure 3.9 below, which restricts the sample to respondents who took the PSTRE test: 34% of test-takers have low proficiency compared with 17% for ECA countries and 15% for the OECD.

Figure 3.9 International Comparisons of ICT Problem Solving Skills

Note: Russian language sample only for Kyrgyz. There is a high percentage of ‘test not applicable’ data for all countries. Kyrgyz: 29%; OECD: 28%; ECA: 34%. Missing are included in total 100%.
In contrast to literacy and numeracy, there is significant improvement over time in PSTRE skills when comparing age cohorts, even in comparing younger cohorts (Figure 3.10). While very few people score above level 1, including among the youngest age cohort, the results show that 49% of 25-34-years olds scored below level 1 compared with 33% of 16-24-year olds, a reduction of nearly one-third.

Figure 3.10 PSTRE Skills Have Improved Over Time

As reported in the 2018 World Bank report on the jobs situation in the Kyrgyz Republic, the proportion of individuals using the internet (on any device) is low, at 28 percent, compared to 55 percent in Kazakhstan and 44 percent in Uzbekistan, although higher that Tajikistan (17 percent) and Turkmenistan (12 percent). More broadly, the Kyrgyz Republic ranks 95th out of 205 countries in terms of ICT access according to the Global Innovation Index, behind the Russian Federation (41st), Kazakhstan (48th), and Moldova (51st), but ahead of Nicaragua (99th), India (107th), and Tanzania (118th) (Ajwad and Gonzalez, 2018, p.57).

The same report highlights how ICT in Kyrgyz Republic is costly and lacks the necessary infrastructure to thrive. Currently, more than 80 percent of the population in Kyrgyz Republic would have to spend at least 10 percent of their household expenditure to obtain a basic mobile plan. High prices and poor service quality for the Internet mean that demand is low, which, in turn, fails to generate incentives for infrastructure investment. Investments
are further hampered by limited competition and stringent regulations to ICT firms entering into the market.

Nevertheless, it is important to stress that further improvements in access to ICT alone will most likely not lead to increasing shares of the population scoring level 2 or higher on the PSTRE, since the latter focuses on problem solving in technologically rich environments. This requires the education system to strengthen problem solving skills. It also requires lifting literacy and numeracy levels; it is difficult to imagine someone score level 1 or below on these core competencies being able to ever score level 2 or higher on PSTRE.

Socio-demographic Characteristics and Skills

Education and Skills Performance

Upper secondary education completion does not appear to have the expected impact on skills. In literacy, 71% of those with less than upper secondary perform at or below level 1 compared with 65% of those who completed upper secondary but did not continue with tertiary\(^4\). In numeracy, these figures are respectively 77% and 66%. In comparison with other OECD countries, on average 42% of PIACC respondents with less than upper secondary and just under 20% of respondents with upper secondary scored at or below level 1 in literacy.\(^5\) Thus, in OECD countries, having upper secondary reduces the percent of low performers by half. However, in Kyrgyz Republic, a back-of-the-envelope calculation suggests that raising upper secondary completion from the current share of 53% to universal completion of 100%, would reduce the proportion of low performers on literacy by only 3 percentage points and in numeracy by only 5 percentage points. This suggests a focus on quality is required.

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\(^4\) Since the ‘upper secondary’ completion refers to people for whom this was the final education level, it therefore excludes people who completed upper secondary and continued onward and completed tertiary. We cannot rule out that upper secondary does significantly contribute to skill building among this latter group that continues.

\(^5\) An analysis of PISA 2009 data similarly finds that an increase of one grade (i.e. among the PISA sample of 15 year olds straddling two different grades in secondary) is associated with an (insignificant) increase of 2.2 points in reading in the Kyrgyz Republic, compared with much higher increases elsewhere: significant increases of 10.4 and 27.9 points, respectively, among the full sample of ECA and full sample of EU countries. These regressions, available upon request, control for female, rural, % funds from government, ECDS, and repeater.
Tertiary education is associated with higher skills outcomes, but much variation in skill levels remain among tertiary graduates. For literacy, when moving from upper secondary to tertiary, the share of low performers drops from 65% to 42%, and for numeracy from 66% to 42%. While positive in comparison, this still means that more than two out of five tertiary graduates have low proficiency. In comparison, in OECD countries less than ten percent of tertiary graduates score at or below level 1. These results are consistent with the World Bank findings from 2013, which found that tertiary and secondary technical/special graduates had significantly higher cognitive abilities than secondary general graduates, although there too was considerable overlap across education levels (p 32).

**Figure 3.11 Literacy (left) and Numeracy (Right)**

Note: Population ages 25-55 years old.

This high variation in skill levels for tertiary graduates is consistent with the modest rates of return to tertiary education found in the 2018 World Bank jobs report and calculated for this report. Holding all other factors constant, wages are positively correlated with education, and with employment sector; on average, tertiary educated workers have about 32% higher wages than workers with similar jobs who have completed only secondary education. This high return is a signal that there is a strong demand for tertiary educated individuals in the Kyrgyz economy, however the Kyrgyz Republic places the lowest premium on tertiary education compared to the rest of the region (Ajwad and Gonzalez, 2018).
With regards to PSTRE, the results show that skills remain a challenge across education levels and, similar to the results in literacy and numeracy, upper secondary education does not appear to improve PSTRE scores beyond lower secondary (Figure 3.12). Individuals with a tertiary education score higher compared to their upper secondary counterparts, however 42% still remain below level 1.

**Figure 3.12 PSTRE Skills by Education Level**

![Bar chart showing PSTRE skills by education level]

Note: Population ages 25-55, Russian sample only, Excluding Missing Data.

These findings are consistent with the 2013 World Bank skills survey. There, adults with tertiary displayed significantly higher cognitive abilities (memory, literacy, numeracy) than secondary general graduates, but there was also considerable overlap across education levels; heterogeneity was very high within education categories as we found also above (Ajwad, et. al, 2014, p32).
Box 3.2 How do Skills of the 2009 PISA Respondents Compare to the General Public?

The 2019 Survey also contained a (separate) sample of the 2009 PISA test participants. These participants scores were compared with the general population of Kyrgyz respondents of the same age (25 and 26-year olds). This serves as a robustness tests: both the 2009 PISA sample and the 2019 adult population sample were designed to be nationally representative. Among 2019 respondents in either sample of the same age, we should therefore expect to see similar results, of course allowing for sampling errors. This is the case. For example, the 2009 PISA participants tested similarly to the general population of the same age (53% vs 55% at or below level one in literacy and 56% compared to 57% at or below level one in numeracy). Comparable percentages are also found at the higher end of the skills distribution. These findings give confidence to the national representation of the surveys.

Figure 3.2.1. Skills by PISA Participation, Literacy (Left) and Numeracy (Right)

Urban versus Rural Locality and Skills Performance

Urban respondents scored higher in literacy, numeracy, and PSTRE compared to their rural counterparts (Figures 3.13 and 3.14). In literacy, 35% of rural residents scored at or above proficiency (level 2), compared with 46% in urban areas. For numeracy, these figures are 32% and 45%, respectively. Rural-urban PSTRE differences are also similar, 35% versus 59%, scoring at basic proficiency (level 1).
Perhaps these rural-urban differences can be explained by higher education levels in the urban areas. To explore this, the next figures allow us to compare rural-urban differences for the *same* level of education. If skills outcomes are the same in rural and urban areas for each education level, then overall differences in rural-urban skills must be explained by differences in education levels. The figures below show that for each education level, the shares of rural and urban respondents scoring *below* level 1 were very similar. In fact, specifically for upper secondary, rural and urban respondents scored similar across all skill levels. We do, however, see that respondents with low levels of education – below upper secondary –, and with high levels of education – tertiary – score better in urban than in rural areas on literacy.
A similar pattern can be observed for numeracy in the tables below. In other words, part of the difference in rural-urban skills scores is the result of low- and highly educated individuals scoring higher in urban than in rural areas.

**Gender and Skills Performance**

Skills are largely gender neutral in Kyrgyz Republic. Forty-one percent of females and 41% of males performed at or above level two in literacy, and 37% of females and 40% of males scored at or above level two in numeracy (Figure 3.17). Like literacy and numeracy skills, PSTRE scores were also largely gender neutral, but with a greater percentage of men scoring at a level 2, 6% of males compared to 1% of females.
Box 3.3 Skills and Labor Force Outcomes of Men and Woman

While skills tend to be gender neutral, this does not equate to gender-neutral labor outcomes. Between 2005 and 2013, female labor participation declined in Kyrgyz Republic, with overall female labor participation rates at 58% in 2013 (Ajwad and Gonzalez, 2018). In particular, young females are significantly less likely to be participating in the labor force in comparison to their male counterparts, with a 35% differential at 20-24-year olds, and a 37% differential at 25-29-year olds (Figure 3.3.1).

Figure 3.3.1. Labor Force Participation Rates, by gender, 2019

This is also indicative in unemployment rates. Females in younger cohorts have significantly higher unemployment rates than males in the same cohort. As time passes, this levels out, and then slightly reverses with more males unemployed than females in the older age cohorts (Figure 3.3.2).

Figure 3.3.2. Unemployment Rate by sex and age

Source: ILO modeled estimates
Immigration Status and Skills Performance

Immigrants (defined as foreign born) tend to have higher skill levels than the native population. In literacy, for every one immigrant achieving a low literacy level (level 1 or below), there are two native adults receiving a low literacy level. For every immigrant achieving a low level in numeracy, there are 1.5 natives receiving a low level. These results hold after adjusting for socio-economic status. Moreover, these results are consistent with results of the 2009 PISA, where after accounting for socioeconomic status, natives underperform 34 points in math and 28 points in reading.
As with literacy and numeracy skills, immigrants score higher on PSTRE skills as well. This is particularly acute since only respondents who took the test in Russian were measured, as this information is unavailable for those who took the test in Kyrgyz. As discussed earlier, those who took the test in Russian tended to score higher than individuals who took the test in Kyrgyz. As such, one could extrapolate that the differentiation is likely higher across the country than represented here.

**Figure 3.19 PSTRE Proficiency Levels by Immigration Status**

Note: Russian Sample Only, Excluding Missing Data.

**Employment and Skills**

The 2013 World Bank survey on skills confirmed international research that finds a correlation between skills and employment outcomes. That survey found that skills varied significantly depending on the quality of the job, an issue that is analyzed in more detail below in Chapter 4. Here, we compare skills at the extensive employment margin comparing those employed, unemployed, and out of the labor force.

In all both literacy, numeracy, and PSTRE, those outside of the labor market scored below the employed and unemployed. However, skill levels do not vary significantly between the employed and unemployed (Figure 3.20). Fifty-five percent of employed respondents in the Russian sample scored at or below level one in literacy, compared to 57% of unemployed respondents. Similarly, 54% of employed respondents scored at or below level 1 in numeracy compared to 59% of unemployed respondents. Meanwhile, 49% of employed respondents scored below level 1 in PSTRE skills, as compared to 50% of
unemployed respondents. This result may seem surprising, but likely reflects that there is much under-employment as opposed to unemployment, with the employed including both jobs in the formal and informal sectors. It is likely that higher skilled people are more likely to take up formal sector jobs than lower skilled people, such as the public sector ones, while lower skilled people are more likely to be in informal jobs. When someone working in the formal sector loses his/her job, s/he becomes unemployed until s/he finds a new formal sector job. When someone working in the informal sector loses his/her job, s/he may not move into unemployment, but rather find another informal job. In the latter case, s/he continues to be considered ‘employed’. Hence, the unemployed category may disproportionately consist of relatively high skilled unemployed people, which would explain why we find no skills differences between the employed and the unemployed.

**Figure 3.20 Skills by Employment, Literacy (Left) and Numeracy (Right)**

![Skills distribution graph]

**Skills Proficiency of Teachers**

To understand whether teachers are sufficiently proficient to address any skills challenges observed in the survey, a separate sample of 399 secondary school teachers were queried, of which 323 took the Russian language test and 76 took the Kyrgyz language test. This study of secondary school teachers complements a recent CLASS classroom observation study of kindergarten teachers, which found that in terms of emotional support, classroom organization, and instructional support, Kyrgyz kindergarten teachers performed similar to teachers in other countries and, like the international evidence, the weakest domain is
instructional support to children (e.g. feedback, encouraging responses, open ended conversations).\textsuperscript{6}

Overall, secondary school teachers vary from the general population in a number of key indicators. On average, teachers are slightly older and more female than the general population, they are much more likely to have a tertiary education, and much more likely to test in Russian rather than in Kyrgyz.

Table 3.1. Teacher Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Teachers</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>398</td>
<td></td>
<td>41.1</td>
<td>11.3</td>
</tr>
<tr>
<td>% Female</td>
<td>399</td>
<td></td>
<td>90.7</td>
<td>29.0</td>
</tr>
<tr>
<td>% Native</td>
<td>399</td>
<td></td>
<td>94.7</td>
<td>22.4</td>
</tr>
<tr>
<td>% Tertiary education</td>
<td>399</td>
<td></td>
<td>79.4</td>
<td>40.5</td>
</tr>
<tr>
<td>% Tested Russian language</td>
<td>399</td>
<td></td>
<td>81.0</td>
<td>39.3</td>
</tr>
</tbody>
</table>

Teachers outperform the general population in both literacy and numeracy, but underperform compared to professionals. Overall, one-third of teachers still have low proficiency in literacy and numeracy. For literacy, 35\% of teachers have a low proficiency (level 1 or below) compared with 59\% for the general population, and the corresponding figures for numeracy are, respectively, 36\% for teachers compared with 61\% of the general population.

\textsuperscript{6} Jennifer LoCasale-Crouch (2016), Center for Advanced Study of Teaching and Learning, University of Virginia. Presentation of results at World Bank.
When comparing across cohorts of teachers, we find notable differences in skills performance across cohorts. For literacy, the share performing level 3 or higher is increasing as cohorts get younger – a positive development. However, the corresponding shares for level 3 or higher for numeracy are getting smaller. Furthermore, for both literacy and numeracy, we see an increasing share of low performers as cohorts get younger: among 25-34-year-old, 38% scores level 1 or below in literacy and 39% in numeracy. For the cohort that is 45-54-year-old, these shares are, respectively, 29% and 26%.

Note: Full sample of teachers
To understand these trends further, we next compare the trends in skills levels of teachers and the skill levels of the general population of the same cohort and with the same level of education – tertiary, which the majority of teachers hold.

Among those with tertiary education, literacy skills of teachers are actually improving with younger cohorts relative to that of the general population. The latter see a decrease in the share with level 3 or more as cohorts get younger, while teachers see an increase.

Figure 3.23 Skills trends Teachers versus Population with Tertiary: Literacy

Numeracy trends between teachers and general population are similar, even if the decline in numeracy skills among teachers with tertiary education is more pronounced than among the general population as cohorts get younger. This is shown in the figures below.
What might explain these skills trends among teachers? Altogether, these comparisons do not provide strong evidence that the pool of teachers being hired is increasingly being drawn from people with lower skill levels, but rather that the decline in skills, numeracy skills especially, across teacher cohorts reflects the trend among tertiary graduates more generally. It may have to do more with the quality of education that these teachers experienced, with numeracy skills declining steadily in more recent years for both high and low performers, and literacy skills declining in more recent years among lower performers while increasing among higher performers.

It is unlikely that the decline in literacy, and especially numeracy skills, as teacher cohorts get younger, can be explained by the fact that older teachers simply have more experience, and thus had time to practice and improve their skills. Afterall, while the share of low performing teachers is higher among younger cohorts, the share of high performing teachers in literacy is higher among younger and thus less experienced cohorts. A sudden decline in quality of education following independence in 1991 is also not a likely explanation. The decline starts after the cohort 45-54 years old, yet the oldest cohort of teachers at 55-65 years, which fully received their own education before Independence, has lower results on the skills tests than the cohorts that follow.
As we will find below, the exception to this is PSTRE skills, which improve among teacher cohorts as they get younger. The improvement in PSTRE skills among younger teachers likely reflects greater exposure, particularly at a younger age.

We next compare urban and rural teachers. Similar to the general population, literacy, and numeracy skills are lower among rural teachers than among urban teachers. Similar shares of teachers score below level 1 and at level 2, but the share of those scoring level 1 is approximately 10 percentage points lower in urban areas, whereas the share of those scoring level 3 or more is approximately 10 percentage points higher in urban areas. That rural teachers score lower may be explained by the fact that a smaller percentage, 63% or rural teachers, completed tertiary education compared with 89% of urban teachers.

Figure 3.25 Teacher Proficiency by Rural/Urban - Literacy (left) and Numeracy (Right)
Finally, while teachers' literacy and numeracy scores are better than the general population, their PSTRE scores are worse: 62% score below level 1, compared with 48% of the general population (Figure 3.26). A breakdown by age cohort (not shown) indicates that only among the youngest cohort of teachers—16-24 years old—are ICT skills similar to that of the general population, with 48% of teachers in this age cohort scoring level 1 or below. A linear probability model predicting those who score below Level 1 (=1) versus those who score Level 1 or 2 (=0), and restricting the sample to teachers, finds that age is the only significant predictor of (low) performance. Whether the teacher is female, has higher education, or works in the urban environment does not significantly predict PSTRE performance.

<table>
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<th>Rural Mean</th>
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<td>144</td>
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<td>30.7</td>
</tr>
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<td>Native</td>
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<td>94.5</td>
<td>22.9</td>
<td>146</td>
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<td>21.4</td>
</tr>
<tr>
<td>%HE</td>
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<td>31.4</td>
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<td>Russian test</td>
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<td>89.3</td>
<td>30.9</td>
<td>146</td>
<td>66.4</td>
<td>47.4</td>
</tr>
</tbody>
</table>
Career Interests and Behavioral Competencies

The survey additionally contained assessments on 'Career Interest and Intentionality' and on 'Behavioral Competencies', standard PIAAC modules. These were offered to the Russian language sample and followed the main Literacy, Numeracy, PSTRE, and use of skills assessments. Since the main tests took a very long time (about 3-4 hours), only a small subsample of the (Russian language) respondents opted to take these additional assessments:

- Career interest: 58 respondents from the population sample and 35 teachers;
- Behavioral Competencies: 55 respondents from the population sample and 42 teachers;

Who are these respondents? The results below indicate that more than two-thirds of these respondents are people who have taken active steps in securing a new job or training, which helps explain why they were motivated to answer these additional modules.

Respondents taking the Career Interest and Intentionality assessment received the following explanation:
"The Career Interest and Intentionality module measures your preferences for different types of work activities and environments, how well your interests match your current or intended job and the level of your intention to seek out new job opportunities and career- and job-related training. The more your intended career and job-related training match your career interests, the greater your career fit. The greater your career fit, the more likely your job will be satisfying and rewarding to you."

To measure career interest, respondents answered a series of questions which resulted in scores (0 to 40, from 'least interesting' to 'most interesting to you') across six types of jobs dimensions:

- ARTISTIC (A): “The Creators” – creative, expressive, imaginative, and like to work with ideas
- CONVENTIONAL (C): “The Organizers” – logical, organized, detail-oriented, and prefer structured environments
- ENTERPRISING (E): “The Persuaders” – ambitious, extroverted, confident, and enjoy leading
- INVESTIGATIVE (I): “The Thinkers” – curious, analytical, logical, and enjoy problem solving
- REALISTIC (R): “The Do-ers” – independent, practical, enjoy the outdoors, and prefer working with their hands
- SOCIAL (S) “The Helpers” - generous, helpful, enjoy teamwork, and helping others

The respondents who opted to take the assessment, found enterprising and social occupations most attractive and investigative and realistic jobs the least interesting.
For the respondents from the general population sample, the gap between the type of job they actually have and the one that they desire, implies a ‘low fit’ for nearly half (47%), and ‘moderate fit’ (28%), and ‘good fit’ (26%) divided evenly.

Respondents were also asked a series of questions around ‘Career Intentionality’, that resulted in 3 classifications (high, moderate, or low intentionality) across four domains of intent:

- Job Seeking (how keen you are to find a new a new job);
- Additional Training (how keen you are to seek additional job training with the next year);
- Self-Efficacy (how confident you are in locating a new job or securing additional training); and,
- Taking Active Steps (having taken initiative to seek a new job).

The figures below show that among the respondents who opted to take the assessment, a large majority has a moderate intent to look for a new job or seek training, with similar percentages expressing confidence in achieving this. Also, more than two-thirds have taken either moderate or high active steps in doing so. Given the fact that respondents self-selected into answering these questions, we can’t generalize to the rest of the population.
The assessment on Behavioral Competencies measured the so-called “Big Five” personality traits, each with subdomains, 13 altogether. Scores range from 0 (lowest) to 100 (highest), with the survey providing respondents with the following explanations:

- **Conscientiousness**: People who are conscientious are usually thorough, organized and efficient as well as committed to doing a good job.
  - **Diligence / Achievement** describes behaviors associated with working towards objectives. Individuals who are high in diligence tend to be described as hard working, ambitious and confident.
  - **Organization / Order** describes behaviors associated with maintaining a sense of order as well as an ability to plan work tasks and work activities.
  - **Dependability / Responsibility** describes behaviors related to a sense of personal responsibility. Individuals who are high in dependability tend to be reliable and make every effort to keep promises.
Self-discipline / Self-control indicates an ability to be patient, cautious and level-headed. People who are high in self-discipline tend to maintain control at work.

Extraversion: People who are extraverted are often described as social, talkative and assertive.

- Assertiveness / Dominance indicates an ability to take charge at work. People who are assertive are often described as direct, decisive and “natural leaders.”
- Friendliness / Sociability indicates an interest in social interactions. People high in friendliness are often interested in meeting new people at work and using this skill for the betterment of the organization.

Agreeableness: People who are agreeable are often perceived as good natured and cooperative.

- Generosity describes individuals who are willing to offer their time and resources in support of others. People high in generosity tend to be helpful to others at work.
- Collaboration / Cooperation describes individuals who are viewed as trusting and cooperative. People high in collaboration are often easy to get along with and work well on teams.

Emotional Stability: People who are emotionally stable tend to be even tempered, composed and maintain a positive attitude.

- Stability / Adjustment describes individuals who are relaxed and worry free. People high in stability work well with changing work priorities and manage stress well.
- Optimism / Well-being describes individuals who have a positive outlook and cope well with setbacks. People who are optimistic tend to incorporate feedback well at work.

Openness to Experience: People who are open to experience tend to be creative, interested in learning and have an intellectual approach.

- Creativity / Ingenuity describes behaviors that are inventive and imaginative. People high in creativity tend to be innovators at work.
- **Intellectual Orientation / Intellectual efficiency** is indicative of an ability to process information and make decisions quickly. People high in intellectual orientation are often viewed as knowledgeable by others.
- **Inquisitiveness / Curiosity** describes behaviors that relate to being perceptive and curious. People high in inquisitiveness tend to be interested in learning more by attending workshops at work.

The respondents from the population sample and from the teacher sample who did the personality trait assessment generally had similar scores across the 13 sub domains. Respondents scored lowest in achievement orientation, responsibility, cooperation, and adjustment, and highest in self-control, sociability, generosity, and ingenuity. Given the fact that respondents self-selected into answering these questions, we cannot generalize to the rest of the population.

**Figure 3.29: Big Five Personality Traits**

This chapter focused on the literacy, numeracy, and PSTRE skills levels of the Kyrgyz population, and further explored the role of socio-demographics in understanding skills in the Kyrgyz Republic. Proficiency is particularly connected to education levels, geography,
and immigration status. This chapter further analyzed the skill level of teachers to understand the challenges they may have in their own skill acquisition that could hinder effective teaching. Teachers generally score higher than the general population in literacy and numeracy, but struggle more with PSTRE skills. Also, a worrying trend is that younger cohorts of teachers have lower numeracy than older cohorts. Finally, the chapter presented the results from the Career Interest and Behavioral Competencies assessments, which were optional modules at the end of the survey. The following chapter will examine how the use of skills in the workplace relates to skill levels and acquisition.
Chapter 4 Use of Skills in the Workplace

Use of Skills in the Workplace

To understand skills’ use in the workplace, it is important to contextualize the labor market. First, job productivity, or output per worker, in the Kyrgyz Republic is the lowest in Europe and Central Asia. Labor productivity, measured as GDP per worker, was about US$7,600 in the Kyrgyz Republic in 2014, while in the Russian Federation it was US$45,000, in Kazakhstan it was US$39,000 and US$11,000 in Moldova (World Bank, 2018). Second, while public sector employment (public administration, education, and health/social services) accounts for only 20 percent of overall employment, this accounts for 60 percent of formal employment. In general, the formal sector in the Kyrgyz Republic is small and usually urban. In 2013, almost two thirds (62 percent) of Kyrgyz workers held an informal job (Ajwad et al, 2014, p.11). Given the large informal sector, the 2013 World Bank skills survey found overall very high levels of physically demanding work among the working population: 40% of all workers, with highs in agriculture (57%) and industry (56%), and lows in services (32%) (Ajwad et al, 2014, p.12).7

The 2019 survey allows us to not only see the latest trends of skills use on the job, but also look across literacy, numeracy, and problem-solving tasks at work. The survey included the same skills use module used by PIAAC surveys. The module assesses the specific skills that respondents use in both their work (and daily lives). The questions in this module focused on skills associated with reading, writing, use of mathematical information and ideas, and information and communications technology (ICT). Specifically, workers are asked to rate the frequency with which they perform different tasks on the job and their responses are aggregated to derive measures of skill use that vary from High, Moderate, to Low.8 However, unlike the PIAAC surveys, questions that queried whether the worker has the skills required for their job and whether the worker has the typical skills required for the job were not answered. As such, standard responses commonly used to address skills

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7 Defined as regularly lifting or pulling anything weighing at least 50 pounds (25 kilograms).
8 Respondents themselves determined whether they would categorize their usage as high, moderate, or low.
mismatches were not available. Finally, like the PSTRE assessment, this module was asked to the Russian language survey respondents only.

We found that most jobs in the Kyrgyz Republic (again, by Russian language survey respondents only) require regular use of reading, writing, numeracy, and ICT skills. When looking across all employed adults, 31% need to read on the job with High (H) frequency, 58% Moderate (M), and 31% use reading tasks at a Low (L) frequency. For writing the figures are similar, 23% (H), 55% (M), and 22% (L), as are the figures for use of numeracy related tasks: 23% (H), 59% (M), and 18% (L).

Looking across occupations, however, we see considerable differences in the use of these skills. Perhaps not surprisingly, nearly 55% of clerical support workers use writing at a high frequency at work, followed by managers (39%). These compare with no craft and related trade workers, skilled agricultural, forestry and fishery workers, or plant/machine operators and assemblers using writing with high frequency.

A similar pattern is seen with reading tasks, with the most frequent use among professionals (44%), followed by technicians and associate professionals (42%) and then clerical support worker (40%), all on the high use end of the spectrum. On the low end are craft and related trade workers, skilled agricultural, forestry and fishery workers, and elementary occupations.

With regards to computers, previous research has shown that computer use at work is relatively low in the Kyrgyz Republic. The 2013 World Bank survey found that in the services sector, only 27 percent of workers use a computer, in industry, 19 percent and in agriculture only 9 percent use a computer. The highest use was reported in state-owned enterprises and government jobs: 41% used a computer in 2013. Only 25 percent of youth use a computer at work, and overall, only 23 percent of Kyrgyz workers use a computer (Ajwad, et al, 2014, p.13). Relative to comparator countries, this figure is low; in Sri Lanka the figure is 30 percent; in Bolivia and Vietnam it is 35 percent; and, in Yunnan province in China, 55 percent of workers use a computer (World Bank, 2018, page 69).
The 2019 Kyrgyz survey shows higher use of computers among the Russian language sample for whom the ICT questions were asked: 38% report high usage of ICT, 45% moderate, and 17% low. Use also varied significantly depending on the profession. Across occupations, clerical workers, craft and related trades workers, and managers reported the highest frequency of ICT use, with 68%, 57%, and 53% respectively reporting high usage. Technicians and associate professionals, and skilled agricultural, forestry and fishery workers reported the lowest frequencies of high ICT use at 18% and 0% respectively.

**Skills (Mis-)Match**

The analysis suggests that a significant share of the workforce is over-educated for the job they are in, yet under-skilled to meet the skills use requirements for the job. The term, skills mismatch, incorporates a variety of different measures and can be used to describe forms of vertical mismatch such as over-/undereducation, over-/under skilling, and skill shortages, to forms of horizontal mismatch such as fields of study (McGuinnes et al, p.1).

The focus in this report is on two types of skills mismatches for which the survey has information: (1) over-/under skilling, as defined here by the frequency of use of a certain skill and the person’s performance of that skill on our test; and, (2) over-/undereducation, as defined here by the person’s international job classification and the level of education that is normally expected to be required for this job. While informative, ideally, we would have had more direct measures of skills gaps. For example, measures capturing whether respondents believe they have the necessary skills to do their job; our survey captures this for computer skills (reported below), but not other skills. Similarly, we lack the perspective of employers, whose insights may reveal whether they are reluctant and/or unable to invest in new types of job because of concerns that the necessary skills to perform these new jobs are not readily available in the labor market.
Over-/Undereducation

Kyrgyz has relatively high levels of over-education compared to OECD countries. We use the job evaluation method in the analysis that follows. It identifies “[...] over-/undereducation by using the International Standard Classification of Occupations (ISCO), which categorizes major occupational groups by level of education in accordance with the International Standard Classification of Education (ISCED)” (McGuinnes et al, 2017, p.5). This is shown in Table 4.1. For example, ‘clerical support workers’ are assigned skill level 2, which in our case effectively corresponds to any education level at the secondary level, but not tertiary. ‘Professionals’, on the other hand, are assigned skill level 4, which corresponds to at least tertiary education. The assignments essentially follow the ILO assignments.

Table 4.1 Matching Education to Jobs Using Skill Levels

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Skill level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary Occupations</td>
<td>1</td>
</tr>
<tr>
<td>Clerical support workers</td>
<td>2</td>
</tr>
<tr>
<td>Craft and related trades workers</td>
<td>2</td>
</tr>
<tr>
<td>Plant and machine operators, and assemblers</td>
<td>2</td>
</tr>
<tr>
<td>Service and sales workers</td>
<td>2</td>
</tr>
<tr>
<td>Skilled agricultural, forestry and fishery workers</td>
<td>2</td>
</tr>
<tr>
<td>Technicians and associate professionals*</td>
<td>4</td>
</tr>
<tr>
<td>Professionals</td>
<td>4</td>
</tr>
<tr>
<td>Armed forces occupations (Excluded – too broad)</td>
<td>1,4</td>
</tr>
<tr>
<td>Managers</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Skill level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary Education (i.e., High School diploma, GED or equivalent)</td>
<td>2</td>
</tr>
<tr>
<td>Secondary education without a diploma</td>
<td>2</td>
</tr>
<tr>
<td>Some Post-Secondary Education (including community, technical or vocational)</td>
<td>2</td>
</tr>
<tr>
<td>4 year College or University degree</td>
<td>4</td>
</tr>
<tr>
<td>Beyond a College or University</td>
<td>4</td>
</tr>
</tbody>
</table>

This exercise demonstrates that nearly two thirds (61%) of the workers (again, Russian language sample), are well-qualified. A small percentage (7%) are underqualified, while nearly one-third (32%) are over-qualified. The underqualified are mostly professionals that lack any form of tertiary education, while the over-qualified are mainly (i) clerical support workers, (ii) craft and related trades workers, and (iii) service and sales workers with tertiary education when their occupation does not necessarily require this. Figure 4.1 below puts these into international comparison, suggesting that Kyrgyz has relatively high levels of over-education compared to OECD countries, with most countries having between 15 and 20 percent of workers being overqualified.
A comparison by gender indicates that women might be slightly better matched (64% compared with 57% of men), with fewer women being overqualified (26% against 38% for men). Further, a slightly higher percentage (64%) of people in urban areas are well-matched than in rural areas (51%).

**Over-/under skilling**

An analysis of under-/over-skilling finds that a substantial share of those with jobs are under-skilled relative to the needs for the jobs they occupy across reading, writing, numeracy, and ICT skills. Over-/under skilling describes a situation where a worker possesses more (fewer) skills than the job requires, regardless of education level.

In our case, we will focus on the *frequency of use* (High, Moderate, Low) of the specific skill (reading, writing, numeracy), and *levels of these skills* (High, Moderate, Low) among workers performing these occupations. The frequency of use comes from the subjective responses of workers, as reported above, while the skills levels categories are derived from classifying someone scoring Level 4/5 as being High, someone scoring Level 2/3 as being Moderate, and someone scoring Level 1 or below as Low. For example, someone reporting Moderate use of reading on the job but having a Low reading score is considered Under-
skilled. If that same person has Moderate reading skills, then s/he is considered Well-matched, and if s/he has High reading skills, then s/he is considered Over-Skilled. Note that the underlying assumption is that low use requires low skills, moderate use requires moderate skills, and high use requires high skills. Of course, this assumption is violated when someone needs to read, for example, very irregularly on the job, but the type of reading is complex and requires high reading skills.

Figure 4.2 below shows the results for all workers (again, in the Russian speaking sample) and, separately, for the sample of teachers. Among workers, we find that the skills match the use for between 36% (PSTRE) and 50% (Numeracy) of workers with the level of skills that these workers possess. And, while the education (mis)match suggested over-qualification for a relatively large share of workers (32% had education levels that were higher than their particular occupation is expected to require), in terms of actual skills, under-skilling is much more prevalent than over-skilling: between 36% (Writing) and 54% (PSTRE) of workers are under-skilled.

Among teachers, levels of under-skilling are similar, or even somewhat higher, as shown in Panel B. PSTRE skills (53% under-skilled) and reading skills (61% under-skilled) in particular.
A comparison of under-/over-skilling by gender, age group, education level, and urban vs rural indicates little variation within each category for reading, writing, or numeracy. For the broad measure of ICT skills, however, as captured by PSTRE, the oldest cohort (55-65 year olds) is much better matched than all cohorts younger, those with upper secondary are better matched than those with tertiary education (a much larger share – 35% versus 61% - is under-skilled), and rural workers are better matched on ICT skills than urban workers (35% versus 57% is under-skilled). Note that this likely reflects that people with tertiary education and urban workers more generally occupy jobs that require higher use of ICT skills, yet their proficiency is lacking.

To understand the occupations in which under-skilling likely creates a real bottleneck, we next examine the percentage of low achievers against the share of workers that use the particular skill at high frequency by occupation.

As shown in Figures 4.3 and 4.4 below, as expected, there is a strong negative correlation between use of these skills in the workplace and the share of people with low actual proficiency levels (at or below level 1) in literacy: the smallest share of low literacy proficiency levels is found among occupations with the highest use of writing and reading tasks. This is shown in the figures below, which plots the share of high frequency of writing
and reading in a given occupations, respectively, against the share of people in that occupation with low literacy levels.

Notwithstanding the finding that higher use of skills at work correlates with smaller shares of low achievers across the professions, the figures also show much variation: conditional on the percentage of low achievers, some professions have much higher use than others. For example, the percentages of low achievers among craft and related trade workers as well as skilled agricultural, forestry, and fisheries workers are very similar to the percentages of low achievers among managers and among professionals, yet these latter two professions use the skills with much higher frequency. The relatively large shares of low achievers among occupations that generally require high skills to raise productivity (i.e. under-skilling), underscores the challenge for Kyrgyz firms and for the economy as a whole to move from a majority informal economy (more than half in 2013) to a higher productivity formal economy.

**Figure 4.3 Use of Writing Skills and Literacy Proficiency**
The differences in use for a given share of low achievers is even greater for numeracy. As shown in Figure 4.5, people’s actual numeracy skills are not a strong predictor of frequency of use of numeracy related tasks. Numeracy proficiencies are not strictly higher among those occupations with high frequency of numeracy tasks. For example, a similar figure - between 20 and 30% - of people in elementary occupations, technicians, managers, clerical support workers, and professionals use numeracy tasks in high frequency in the workplace, but the share of low achievers at numeracy varies widely across these occupations, from as many as 52% of people in elementary occupations to as few as 27% of professional occupations.
These numeracy findings complement the 2013 World Bank skills survey findings. It found that workers with higher numeracy skills tend to engage less in physically demanding work than those with lower numeracy skills, differences that hold in urban and rural settings, and between men and women. Still, the majority of respondents with high numeracy skills did not use their numeracy skills on the job: among men, more than 60 percent, and among women more than 75 percent with high numeracy skills did not use it on the job (Ajwad, et al, 2014, p 23).

Finally, frequency of computer use at work is often considered a strong indicator for PRSTE skill level and while this generally holds in Kyrgyz Republic, there are some significant outliers. While clerical workers and managers report some of the highest frequency rates of computer use, 68% and 53% respectively, do not possess basic PSTRE skills, scoring below level 1. And while professionals reported one of the lowest rates of high ICT use, more professionals scored higher in PSTRE skills than their counterparts who are clerical workers or managers (Figure 4.6). This suggests that exposure to a computer at work does not explain PSTRE skills alone. As such, increasing access to computers would not be expected to improve PSTRE skills in and of itself. A combination of education, training, and access is necessary.
These findings are further confirmed by workers’ own concerns regarding their skills. Overall, 42% of the population believes they do not have the adequate computer skills to do their job. Younger workers are more confident in their skills with 81% of 16-24 years believing they have the skills necessary compared to 24% of 55-65-year olds.

**Education, Skills, and Earnings**

We found evidence that a substantial share of people is over-schooled but under-skilled. This section explores the implications for earnings and finds, reassuringly, that higher skilled groups of people do earn higher wages. To do so, we combine information from the 2018 Kyrgyz Integrated Budget and Labor Force Survey (KIHS) and our 2019 survey.

First, figure 4.6 below shows that median earnings are relatively flat across age cohorts for those who have completed primary education and those with completed general secondary education. Among those with specialized education (e.g. vocational), earnings increase until about age 59 before declining. Tertiary graduates experience the steadiest earnings increase by age. When comparing earnings across education levels, the figure shows that those who completed general secondary earn similar amounts as those who only completed primary. This is consistent with the findings above that skills levels were similar between those with upper secondary and those with less education. On the other hand, those with
specialized secondary and those with tertiary earn more, with the latter consistently more than the former from age 39 onwards. When combined across all ages, those with specialized secondary earn on average 4% more than those with either general secondary or with primary (there are no wage differences between these two groups), rising to 8% for those with tertiary (higher) education.

**Figure 4.6 Age-earning Profile, by age and education groups**

![Age-earning Profile](image)

Notes: Median monthly wages. Completed levels of education.

We next explore the skills-earnings nexus. The KIHS data do not contain direct information on skills. Instead, we first create 48 unique population groups resulting from the combination of age groups, gender, urban/rural, and level of education. In both the KIHS data and our 2019 data, we can assign respondents to one of these 48 groups. In our 2019 data we can calculate the average skills scores for each group. In the KIHS data we can calculate median wages for each group. Figure 4.7 plots the results. If all that mattered for wages were skills, regardless of education, age, etc. there should be a perfect correlation between skills and wages.
The figures show that skills correlate positively with wages. Likewise, an econometric model on earnings suggests that a one standard deviation increase in literacy skills is associated with approximately a 17% increase in wages. In an identical regression replacing literacy score with a dummy for tertiary education shows that the latter is associated with a 32% increase in wages. This is consistent with the fact that tertiary is not only associated with higher literacy but also other skills. In a third regression, with both tertiary and literacy included results in smaller coefficient estimates for both. Tertiary is now associated with an increase in wages of 17% and literacy with a 12% increase in wages.

While tertiary graduates earn, on average, considerably higher wages, and tertiary graduates have, on average, higher skill levels, our earlier results also showed that among tertiary graduates there is still much variation in skill levels. In other words, for employers looking to hire someone, tertiary education is not a very precise predictor of skills. Employers must therefore also be using other ways to identify higher skills performance and reward accordingly through higher wages. For example, through job interviews, references, and observing employee productivity as workers build up job histories.
As demonstrated in this chapter, use alone does not demonstrably equate to skill levels in Kyrgyz Republic. The following chapter will examine the potential reasons for skills levels and begin to explore paths forward.
Chapter 5 Building Skills for the Future

Generating New Insights on Skills in Kyrgyz Republic

This report summarizes the findings from the 2019 skills survey for the adult Kyrgyz population. The skills measures used in this survey followed the same questions and approach as the OECD’s PIAAC surveys. As such, this survey complements previous findings on skills for the adult Kyrgyz population in several important ways:

- The 2019 survey includes measures of literacy, numeracy, and problem-solving in technology rich environments (PSTRE). We can therefore assess whether these skills vary across key population characteristics.
- The 2019 survey followed the PIAAC questions and methodology. This methodology was designed to assign respondents to different well-defined and internationally comparable proficiency levels. We can therefore not only assess whether Kyrgyz adult skill levels are more basic or more advanced, but we can also make international comparisons with countries that implemented PIAAC surveys.
- The 2019 survey includes a detailed assessment of use of these skills in the workplace. We can therefore assess use of skills in the workplace and how they relate to skills required.
- The 2019 survey includes a separate sample of secondary school teachers. We can therefore assess whether teachers have the necessary skill levels to equip the next generation.

Main Findings on Skills in the Adult Population

Our main findings are that skills levels are consistently low in absolute levels, among varying socio-demographic groups, and relative to countries that implemented PIAAC surveys. Results are not improving across cohorts.
While level 2 is considered the minimal proficiency level for literacy and numeracy, a significant share of the adults in Kyrgyz Republic performed at or below level 1 in literacy and numeracy. In literacy, 59% of adults scored at or below level one, and in numeracy 60% did. Among those who scored higher, about three quarters performed at level 2. Altogether, only about 10% performed at level 3 or higher. In practice this means that in literacy, the majority of the adult population has, at best, knowledge of and is able to recognize “basic vocabulary, determining the meaning of sentences, and reading paragraphs of [relatively short digital or print] texts”, while in numeracy the majority of the population is, at best, able to engage in “simple processes involving counting; sorting; performing basic arithmetic operations; and identifying elements of simple or common graphical or spatial representations.” In comparison, only 19% of adults in OECD countries and 22% of adults in ECA countries score at or below level one on literacy, with corresponding numeracy rates being 24% (OECD) and 25% (ECA).

**PSTRE skills do not meet the needs of the 21st century.** Ninety-eight percent of respondents have at most, level 1 PSTRE proficiency (see Figure 3.7), which means that respondents only have basic skills to use of widely available and familiar technology applications, such as e-mail software or a web browser. There is little or no navigation required to access the information or commands required to solve the problem. […].” Restricting the sample further to Russian language respondents who had at least the most basic PSTRE skills needed to take the test, the report finds that 34% of test-takers score below level 1 compared with 17% for ECA countries and 15% for the OECD.

**Completion of upper secondary does not equate to significantly improved skill levels.** While some improvement in skills exists between those who have and have not completed upper secondary, the impact is relatively small in comparison to international norms. In literacy, 65% of those with upper secondary perform at level 1 or below compared to 71% of those with less than upper secondary compared with. In numeracy, these figures are, respectively 66% and 77%. Overall, two-thirds of upper secondary respondents do not have basic literacy and numeracy skills.
Tertiary education is associated with higher skill levels, but skill levels remain low and vary significantly. In literacy, those scoring at or below level 1 fall from 65% percent of upper secondary respondents to 42% of tertiary respondents. A similar decline is seen in numeracy, with 66% of respondents with upper secondary scoring at or below level 1 compared to 42% of tertiary respondents. While this improvement in skills is significant, a meaningful ratio of tertiary students does not have basic literacy and numeracy skills (2:5).

Urban participants demonstrated higher literacy, numeracy, and PSTRE skills compared to their rural counterparts. Sixty-four percent of rural respondents scored at or below level 1 in literacy (compared to 53% of urban respondents), 68% scored at or below level one in numeracy (compared to 55% of urban respondents), and 65% scored below level 1 in PSTRE skills (compared to 41% of urban respondents).

Skills are largely gender neutral. Males and female perform at generally the same levels in literacy, numeracy, and PSTRE. Fifty-nine percent of males and 59% of females scored at or below level 1 in literacy.

Foreign born respondents have higher literacy, numeracy, and PSTRE skills. Only 29% of immigrant respondents scored at or below level 1 in literacy, 41% scored at or below level 1 in numeracy, and 38% below level in PSTRE. In comparison, 60% of native-born Kyrgyz scored at or below level 1 in literacy, 61% scored at or below level 1 in numeracy, and 49% scored below level 1 in PSTRE.

Skills do not vary significantly between the employed and unemployed. Recall that whether a respondent was employed or not was only available on the Russian sample of the survey. In that sample, 55% of employed respondents performed at or below level one in literacy, compared to 57% of unemployed respondents. Numeracy results were similar with 54% of employed respondents scored at or below level 1 in numeracy compared to 59% of unemployed respondents. The unemployed scored slightly higher on PSTRE skills than the employed (6% unemployed scored at level 2 compared to 2% of employed).
Results do not improve across age cohorts in numeracy and literacy. A comparison of literacy and numeracy performance across age cohorts indicates that the low performance is relatively consistent and is not steadily improving with more recently educated adults.

While remaining relatively low, PSTRE skills show improvement across age cohorts. The same comparison of age cohorts for PSTRE skills demonstrate steady improvement across age cohorts with 33% of 16-24 years scoring below level 1 compared to 63% of 55-65-year olds.

Most jobs in the Kyrgyz Republic require regular use of reading, writing, numeracy, and ICT skills. When looking across all employed adults (data available for Russian language respondents only), 31% need to read on the job with high frequency and 58% with moderate frequency, with similar figures for writing and numeracy tasks. Usage of ICT was even higher, with 38% reporting high usage of ICT and 45% moderate usage.

There is evidence that a substantial share of people are over-schooled, but under-skilled. Over-/under education refers to a situation where a worker possesses a higher (lower) level of education than the occupation is expected to need, while over-/under skilling describes a situation where a worker possesses more (fewer) skills than the job requires, regardless of education level. The analysis finds that 32% of respondents had education levels that were higher than their particular occupation is expected to require, but when it comes to actual skills, under-skilling is much more prevalent than over-skilling, with 36% of respondents under skilled in writing and 54% of workers being under-skilled in PSTRE.

Reassuringly, the analysis does find that higher skilled groups of people earn higher wages, suggesting that the labor market rewards higher skills.
Skills are developed throughout all stages of life—from conception to preschool, primary, secondary, higher education, and on the job. The labor market increasingly requires adults with strong foundational skills, however, a large percentage of adults in Kyrgyz Republic perform well below this foundational level. The findings do not provide a complete picture of skills formation at each of these levels, but they do provide important insights. We found that the quality of education is likely an important driver for low skills performance; the significant variation in skills within education levels creates a potential mismatch between acquired skills and required skills in the marketplace; and the high usage of skills suggest an opportunity for upskilling on the job. This section will examine each issue and provide policy recommendations targeted to stages within the lifecycle.

The lack of quality of education is an important driver for low skills performance.

We found that the education system underperforms; while there are big challenges improving education completion levels at upper secondary and higher, even for the existing educational attainment, the Kyrgyz Republic scores very low in terms of literacy and numeracy outcomes.

Higher levels of education are associated with higher skills levels, but even among the most educated, a large share has low skills scores, which helps explain why we find that a large share can be over-schooled but under skilled for the jobs they occupy. Consistent with the 2013 skills survey, there is much variation in skills among adults with the same educational background. For example, among adults that are university graduates, 42 percent scores at most level 1 in both literacy and numeracy, and the same percentage scores below level 1 in PSTRE skills. This indicates that even among the most educated adults, a very large share has only minimal literacy, numeracy, and PSTRE skills.

To determine the degree to which quality is a concern, let’s first assess what would happen to skills levels if education completion were to increase without increasing quality of education. Mean years of schooling for the population aged 25 years and above is
approximately 11 years in the Kyrgyz Republic. Net enrolment rates are high in primary (90%) and lower secondary education (90%), but drop sharply in upper secondary (53%) (Source: UNESCO, 2020).

Based on the average years of schooling alone, a comparison with other countries predicts that the share of low performers should be closer to 30%, not nearly the actual 60% found in the 2019 survey. This is shown in the graph below:

**Figure 5.1 Means Years of Schooling and Low Literacy Performance**

This indicates that for the same years of schooling, education systems in other countries perform better in literacy. Furthermore, reducing the very high drop out in upper secondary, while an important objective on its own, will not by itself result in a large improvement in literacy and numeracy performance. This is shown in Figure 3.10, which examines the skills results from the 2019 survey according to the education levels of the respondents. Those having completed upper secondary perform better on literacy and numeracy than those with less than upper secondary, but the improvement is modest.

Secondary school teachers also score worrisomely low on the three skills dimensions. An analysis of the skills results among a sample of 399 secondary school teachers underscores the challenge that the education system faces when it comes to building skills of its pupils.
While secondary school teachers outperform the general population in both literacy and numeracy, more than one-third of teachers still have low proficiency in literacy and numeracy (level 1 or below), raising concerns about their ability to successfully impart skills on secondary school pupils. Furthermore, younger cohorts of teachers perform worse than older cohorts of teachers, and rural teachers worse than urban teachers. Finally, with regards to PSTRE skills, secondary school teachers actually score worse than the general population.

Recommendations

Recommendation 1: Address learning outcomes. Focusing on quality begins with early childhood education (3-6 years old). Standards for effective practices in child development should be implemented to ensure the building of foundational skills and readiness to learn. Rapid and more equitable expansion of access to preschool education is a priority to equalize universal coverage of all children aged 3-6 years and into the 0-3 cohorts. The government has recognized this and prioritized in its latest education strategy. The expansion should be complemented with shifts in how curriculum is delivered in the early years and resources available to sustain. Explorative and play-based learning should be prioritized for socio-emotional development, which prepares students to engage in the classroom and society. Students should also have access to a variety of learning and reading materials to spark understanding and interest in reading and learning.

A focus on quality includes enhancing the learning of basic cognitive and non-cognitive skills. A large portion of the curriculum currently uses memorization of facts and multiple-choice responses to acquire and test knowledge. Competency-based curriculum and assessments, which center on higher level skills of understanding, critical thinking, and application of knowledge, will help students integrate the knowledge they learn with problems they will be asked to address in the future marketplace. Digital literacy is a key component of this, as recognized in the Government’s 2040 Strategy and the draft Education Sector Plan for 2021-2026. Classroom access to the computers and the internet are essential to having a future workforce who are digitally literate. Digital literacy is
particularly important in times where remote learning is required, such as during the COVID-19 crisis. In order for learning to continue, teachers and students need to have access to and solid computer literacy skills. Teacher quality and pedagogical practice is another key factor together with more rigorous assessment to measure student learning outcomes. The government has started working on these issues and may consider ramping up the investments and the interventions.

**Recommendation 2: Make post-secondary and tertiary education labor market relevant.**

While important to continue increasing enrollment at the post-secondary and tertiary level (16-22-year olds) in Kyrgyz Republic, this has less impact if the quality of education does not address the needs of society. Post-secondary and tertiary education need to include a focus on intermediate literacy, numeracy and PSTRE skills. The significant variation in skills at this level, indicates a need for continuing to build these skills. Increased participation in post-secondary and tertiary education must be accompanied by improvements in literacy, numeracy and PSTRE skills. It is a further imperative to increase the relevance of post-secondary and tertiary education through creation of curriculum aligned with the changing needs to the labor market, be it entrepreneurial or technical and job specific and increasingly the social-emotional skills that employers value more.

**Recommendation 3: Invest in teachers’ professional development.** The quality of education is only as strong as its teachers. The findings in this report indicate an opportunity to improve the quality of education by providing upskilling opportunities for teachers with specific skill deficiencies, focusing first on teachers with only basic literacy and numeracy skills. With regards to PSTRE skills, the results suggest that nearly all secondary school teachers do not have adequate PSTRE skills. This finding is particularly salient during the COVID-19 crisis, as remote learning is implemented. Strengthening the ability of teachers to perform in technology rich environments would assist in addressing quality concerns in online and remote teaching and learning. Currently, teachers not well equipped to impart PSTRE skills on their students, and broad upskilling in this area, coupled with ICT teaching in the curriculum, may be an opportunity to improve ICT skills for young people about to enter the labor market. The Ministry of Education and Science continuous professional
development (CPD) could address these needs, but would need to be restructured. As currently operated, CPD does not allow for individualized improvement, is expensive, and difficult for many teachers to access. Instead development programs should identify teachers’ specific needs in the classroom and provide means for skill development across the country. The implementation of the draft teacher competency framework could assist in this process as it includes CDP programs and aligns with a competency based should also be implemented. In addition, adjusting the curriculum and providing stronger quality assurance measures to address these core skill competencies in the teacher pre-service programs could assist in confirming that teachers have the knowledge required for their teaching level. Ensuring that teachers pass a mandatory skill test before beginning in the profession could also act as an external quality assurance measure.

The high usage of skills combined with the level of under skilled workers suggest an opportunity for upskilling on the job.

The main insights from the survey on skills use are restricted to the Russian speaking sample where the job skills use module was administered. This is an important caveat as the Russian speaking sample generally scores higher on literacy and numeracy skills.

The significant variation in skills within education levels creates a mismatch between acquired skills and required skills in the marketplace. In the absence of other qualifications, employers frequently use education as a signifier of skills. Improving skills within the education system would help to alleviate this mismatch and aid employers in identifying skilled workers. Moreover, opportunities for short professional programs and post-secondary opportunities to boost skills could aid in improving skills and signaling to employers the type of skills workers possess.

The survey finds that for literacy, numeracy, and ICT related tasks, adults with jobs requiring these in higher frequency tend to score higher; however, there is variation in skills levels with significant under skilling profession. Programs and policies intended to
improve adult proficiency in skills through education and training both inside and outside of the job can have significant economic and social benefits.

**Recommendation 4: Enhance skills throughout one’s life.** Skills can be maintained and grown in the workplace. Basic and advanced skills may be developed on the job that can supplement one’s education. This is particularly valuable for individuals who learn better by practice and can help to sustain not only the entry level labor market, but aid in creating a strongly skilled workforce overall.

Consider learning a lifelong endeavor with pathways where adults have access to meaningful learning opportunities on the job, in and out of the workplace. This requires development of adult learning programs and materials targeting skills and aligning with international best practices. E-learning can be one effective method for improving not only basic literacy and numeracy skills, but also boosting ICT skills simultaneously. This could be integrated with face-to-face learning to encourage engagement and ensure accountability.

In line with the OECD report on Skills (2016b), we find that investing in improving literacy, numeracy, and PSTRE can have substantial long-term benefits for the economy and society. This can begin to be addressed through improved emphasis on skills acquisition at all levels of education, programs to facilitate skills matching and transition to the workplace and targeted on the job training and post-secondary level programs to improve skills.
References


Appendices

Appendix A. Ordinary Least Square Model on the Determinants of Wages in Kyrgyz

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Wages</th>
<th>(2) Wages</th>
<th>(3) Wages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>-0.119</td>
<td>-0.120</td>
<td>-0.120</td>
</tr>
<tr>
<td></td>
<td>(0.153)</td>
<td>(0.151)</td>
<td>(0.152)</td>
</tr>
<tr>
<td>Rural</td>
<td>-0.331**</td>
<td>-0.231</td>
<td>-0.264</td>
</tr>
<tr>
<td></td>
<td>(0.153)</td>
<td>(0.189)</td>
<td>(0.188)</td>
</tr>
<tr>
<td>Age: 35-44</td>
<td>-0.278**</td>
<td>-0.346**</td>
<td>-0.323**</td>
</tr>
<tr>
<td></td>
<td>(0.132)</td>
<td>(0.131)</td>
<td>(0.140)</td>
</tr>
<tr>
<td>Age: 45-54</td>
<td>0.0469</td>
<td>-0.0437</td>
<td>-0.0140</td>
</tr>
<tr>
<td></td>
<td>(0.150)</td>
<td>(0.153)</td>
<td>(0.163)</td>
</tr>
<tr>
<td>Age: 55-65</td>
<td>-0.0936</td>
<td>-0.0884</td>
<td>-0.0901</td>
</tr>
<tr>
<td></td>
<td>(0.282)</td>
<td>(0.281)</td>
<td>(0.282)</td>
</tr>
<tr>
<td>Tertiary education</td>
<td>0.319**</td>
<td></td>
<td>0.166</td>
</tr>
<tr>
<td></td>
<td>(0.132)</td>
<td></td>
<td>(0.136)</td>
</tr>
<tr>
<td>Literacy score</td>
<td></td>
<td>0.175*</td>
<td>0.117</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0937)</td>
<td>(0.112)</td>
</tr>
<tr>
<td>Constant</td>
<td>8.305***</td>
<td>8.401***</td>
<td>8.349***</td>
</tr>
<tr>
<td></td>
<td>(0.227)</td>
<td>(0.201)</td>
<td>(0.216)</td>
</tr>
<tr>
<td>Observations</td>
<td>48</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.224</td>
<td>0.233</td>
<td>0.244</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Wages in natural logarithm; Literacy score in standard deviation. Reference groups: female, urban, 25-34 years old, upper secondary education or below.
### Appendix B. Description of Literacy Proficiency Levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Score range</th>
<th>Percentage of adults scoring at each level (average)</th>
<th>Types of tasks completed successfully at each level of proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Level 1</td>
<td>Below 176 points</td>
<td>4.5%</td>
<td>The tasks at this level require the respondent to read brief texts on familiar topics to locate a single piece of specific information. There is seldom any competing information in the text and the requested information is identical in form to information in the question or directive. The respondent may be required to locate information in short continuous texts. However, in this case, the information can be located as if the text were non-continuous in format. Only basic vocabulary knowledge is required, and the reader is not required to understand the structure of sentences or paragraphs or make use of other text features. Tasks below Level 1 do not make use of any features specific to digital texts.</td>
</tr>
<tr>
<td>1</td>
<td>176 to less than 226 points</td>
<td>14.4%</td>
<td>Most of the tasks at this level require the respondent to read relatively short digital or print continuous, non-continuous, or mixed texts to locate a single piece of information that is identical to or synonymous with the information given in the question or directive. Some tasks, such as those involving non-continuous texts, may require the respondent to enter personal information onto a document. Little, if any, competing information is present. Some tasks may require simple cycling through more than one piece of information. Knowledge and skill in recognising basic vocabulary determining the meaning of sentences, and reading paragraphs of text is expected.</td>
</tr>
</tbody>
</table>
| 2           | 226 to less than 276 points | 33.9%                                               | At this level, the medium of texts may be digital or printed, and texts may comprise continuous, non-continuous, or mixed types. Tasks at this level require respondents to make matches between the text and information, and may require paraphrasing or low-level inferences. Some competing pieces of information may be present. Some tasks require the respondent to:  
  - Cycle through or integrate two or more pieces of information based on criteria  
  - Compare and contrast or reason about information requested in the question  
  - Navigate within digital texts to access and identify information from various parts of a document. |
| 3           | 276 to less than 326 points | 35.4%                                               | Texts at this level are often dense or lengthy, and include continuous, non-continuous, mixed or multiple pages of text. Understanding text and rhetorical structures become more central to successfully completing tasks, especially navigating complex digital texts. Tasks require the respondent to identify, interpret or evaluate one or more pieces of information, and often require varying levels of inference. Many tasks require the respondent to construct meaning across larger chunks of text or perform multi-step operations in order to identify and formulate responses. Often tasks also demand that the respondent disregard irrelevant or inappropriate content to answer accurately. Competing information is often present, but it is not more prominent than the correct information. |
| 4           | 326 to less than 376 points | 10.0%                                               | Tasks at this level often require respondents to perform multiple-step operations to integrate, interpret or synthesise information from complex or lengthy continuous, non-continuous, mixed, or multiple type texts. Complex inferences and application of background knowledge may be needed to perform the task successfully. Many tasks require identifying and understanding one or more specific, non-central idea(s) in the text in order to interpret or evaluate subtle evidence-claim or persuasive discourse relationships. Conditional information is frequently present in tasks at this level and must be taken into consideration by the respondent. Competing information is present and sometimes seemingly as prominent as correct information. |
| 5           | Equal or higher than 376 points | 0.7%                                                | At this level, tasks may require the respondent to search for and integrate information across multiple, dense texts; construct syntheses of similar and contrasting ideas or points of view; or evaluate evidence-based arguments. Application and evaluation of logical and conceptual models of ideas may be required to accomplish tasks. Evaluating the reliability of evidentiary sources and selecting key information is frequently a requirement. Tasks often require respondents to be aware of subtle, rhetorical cues and to make high-level inferences or use specialised background knowledge. |

Note: The percentage of adults scoring at different levels of proficiency adds up to 100% when 1.4% of literacy-related non-respondents across countries/economies are taken into account. Adults in this category were not able to complete the background questionnaire due to language difficulties or learning and mental disabilities (see section on literacy-related non-response).

Source: OECD, 2016b.
## Appendix C. Description of Numeracy Proficiency Levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Score range</th>
<th>Percentage of adults scoring at each level (average)</th>
<th>The types of tasks completed successfully at each level of proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Level 1</td>
<td>Below 176 points</td>
<td>6.7%</td>
<td>Tasks at this level require the respondents to carry out simple processes, such as counting, sorting, performing basic arithmetic operations with whole numbers or money, or recognising common spatial representations in concrete, familiar contexts where the mathematics content is explicit with little or no text or distractors.</td>
</tr>
<tr>
<td>1</td>
<td>176 to less than 226 points</td>
<td>16.0%</td>
<td>Tasks at this level require the respondent to carry out basic mathematical processes in common, concrete contexts where the mathematical content is explicit, with little text and minimal distractors. Tasks usually require one-step or simple processes involving counting, sorting, performing basic arithmetic operations, understanding simple percentages, such as 50%, and locating and identifying elements of simple or common graphical or spatial representations.</td>
</tr>
<tr>
<td>2</td>
<td>226 to less than 276 points</td>
<td>33.0%</td>
<td>Tasks at this level require the respondent to identify and act on mathematical information and ideas embedded in a range of common contexts where the mathematics content is fairly explicit or visual with relatively few distractors. Tasks tend to require the application of two or more steps or processes involving calculation with whole numbers and common decimals, percentages and fractions; simple measurement and spatial representation; estimation; and interpretation of relatively simple data and statistics in texts, tables and graphs.</td>
</tr>
<tr>
<td>3</td>
<td>276 to less than 326 points</td>
<td>31.8%</td>
<td>Tasks at this level require the respondent to understand mathematical information that may be less explicit, embedded in contexts that are not always familiar and represented in more complex ways. Tasks require several steps and may involve the choice of problem-solving strategies and relevant processes. Tasks tend to require the application of number sense and spatial sense; recognising and working with mathematical relationships, patterns and proportions expressed in verbal or numerical form; and interpretation and basic analysis of data and statistics in texts, tables and graphs.</td>
</tr>
<tr>
<td>4</td>
<td>326 to less than 376 points</td>
<td>10.2%</td>
<td>Tasks at this level require the respondent to understand a broad range of mathematical information that may be complex, abstract or embedded in unfamiliar contexts. These tasks involve undertaking multiple steps and choosing relevant problem-solving strategies and processes. Tasks tend to require analysis and more complex reasoning about quantities and data; statistics and chance; spatial relationships; and change, proportions and formulas. Tasks at this level may also require understanding arguments or communicating well-reasoned explanations for answers or choices.</td>
</tr>
<tr>
<td>5</td>
<td>Equal or higher than 376 points</td>
<td>1.0%</td>
<td>Tasks at this level require the respondent to understand complex representations and abstract and formal mathematical and statistical ideas, possibly embedded in complex texts. Respondents may have to integrate multiple types of mathematical information where considerable translation or interpretation is required; draw inferences; develop or work with mathematical arguments or models; and justify, evaluate and critically reflect upon solutions or choices.</td>
</tr>
</tbody>
</table>

*Note: The proportion of adults scoring at different levels of proficiency adds up to 100% when the 1.4% of numeracy-related non-respondents across countries/economies are taken into account. Adults in the missing category were not able to provide enough background information to impute proficiency scores because of language difficulties, or learning or mental disabilities (see section on literacy-related non-response above).*

*Source: OECD, 2016b.*