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National Forum on the
Future of Work in Egypt
Joining Forces for Tomorrow and Beyond

The Future of Skills in the Egyptian Labour Market

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National Forum on the
Future of Work in Egypt
Joining Forces for Tomorrow and Beyond

ECONOMIC RESEARCH FORUM
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CONTENTS

FIGURES

INTRODUCTION

Technological change brings both progress and disruption to labour markets. For example, there are concerns that automation may lead to the loss of jobs, particularly middle class jobs, globally (Autor 2015) and in Egypt (Helmy 2015). In reality, technological change is unlikely to lead to extensive job losses (Acemoglu et al. 2022; Aghion et al. 2022; Arntz, Gregory, and Zierahn 2019; Autor 2015; Fox and Signé 2021). Instead, future work will have a different occupational structure and require different skills (Aghion et al. 2022; Autor 2015; Hardy, Keister, and Lewandowski 2018; Schlogl and Sumner 2018).

What skills will the Egyptian labour market require in the future?

Understanding the skills needed in the labour market is critically important for students, workers, employment services, and policymakers to ensure they supply the skills demanded in the future labour market. Yet Egypt lacks nationally representative surveys on current skill demand, making projecting future skill demand even more difficult. This report uses nationally representative Egyptian labour market data from 2017 through 2021, projections of employment through 2030, and international (O*NET) data on the skills, abilities, and knowledge different occupations require to assess the future of skill demand in the Egyptian labour market.

The requirements of occupations are organized into three domains: **skills, abilities, and knowledge**. The report focuses on the top five skills, abilities, and knowledge the **O*NET data** suggests are needed in different occupations and in the future Egyptian labour market overall. Analyses highlight the skills needed for technical secondary graduates as compared to other education levels, in specific occupations and industries, for new entrants versus experienced workers, and in jobs held by women versus men.

The next section reviews the global evidence on skill demand and the future of work, while the following section presents the existing research on skills in Egypt. The third section discusses the Egyptian and skills data sources. The results on the skills needed are presented in the fourth section, followed by a concluding section discussing the implications of the results for education and labour market policy.

CHAPTER 1 Global Evidence on Skill Demand and the Future of Work

The future of work is often presented in dramatic terms (Willcocks 2020). Some studies claim technological change, particularly automation, will lead to major job losses. For instance, one study estimates that half of jobs globally (and a similar share in Egypt) could be automated with existing technology (Chui, Manyika, and Miremadi 2017). Such studies, assessing which jobs could potentially be automated, examine only part of the picture, the downside of technological change. It is **not accurate to interpret jobs that could potentially be automated as pure job losses**, without also considering potential job creation (Arntz, Gregory, and Zierahn 2019).

While there is concern that technology would replace (substitute for) workers, technology also can act as a complement to workers (Autor 2015). Technology can make workers more productive, including in ways that lead to higher demand for labour (Aghion et al. 2022). For instance, one study of 12 Asian countries estimated there were 101 million job losses annually due to modern technology and information and communication technology (ICT), but also 134 million jobs created due to increased demand for goods and services (Asian Development Bank 2018). In a review of the global literature on the employment impacts of automation, there was **no clear consensus across studies on job impacts** (Schlogl and Sumner 2018). Nor is there any clear consensus in the global literature about what the future of work will look like (Balliester and Elsheikhi 2018).

Changes in the structure of the **economy and technology** can lead to **changes** in the **occupations and skills required in the labour market** (Hardy, Keister, and Lewandowski 2018). Because technology is a complement to skills it can lead to "skill-biased" shifts in labour demand (Acemoglu and Autor 2011). In some cases, more than through particular occupations growing or shrinking, technological change affects the tasks and skills within jobs. For instance, one study of the tasks in jobs over five decades in the United States showed that 88% of the changes in tasks in the labour market occurred within occupations rather than through changes in the structure of employment (Atalay et al. 2020).

The global evidence on technology, automation, and employment shows changes in the structure of the economy and skills, more so than the overall amount of employment. In developing countries, digital adoption does not affect unemployment rates, but does lead to shifts from self-employment to wage employment (Shapiro and Mandelman 2021). In the United States, over 2010-18, there was fast growth in artificial intelligence (AI) related occupations (Acemoglu et al. 2022). As firms adopted AI, they reduced hiring in non-AI jobs and required different skills. However, this led to no effect of AI on overall employment or wages (Acemoglu et al. 2022).

A more positive framing is that, particularly in developing countries, the new technologies of the "fourth industrial revolution," including artificial intelligence, can lead to better labour market prospects (Fox and Signé 2021). Realistically, however, employment transformation in regions such as Africa is going to be driven by economies' structures

and demographics, with only small shifts in trajectories due to "fourth industrial revolution" technological advancements. Whether countries experience positive or negative effects from this technological change depends on the current structures of their economies and labour markets, as well as the policy choices they make (Fox and Signé 2021). Some sectors, such as agriculture and industry, tend to be more automatable than others (Schlogl and Sumner 2018).

What skills are needed to navigate the changing labour market?

The global literature often distinguishes between **routine tasks**, which can potentially be automated or codified in computer software, and non-**routine tasks**, which cannot (Acemoglu and Autor 2011). Abstract, analytical tasks are non-routine and may be particularly complementary to new technologies. Some non-routine tasks are also manual, such as working as a health aide, and difficult to automate. Technological change has often replaced routine tasks with technology, leading to a polarization of skills and occupations needed, with professional and managerial jobs on one end and service and non-routine labour on the other (Acemoglu and Autor 2011).

The **skill content of occupations varies** with countries' **level of development** and **technology**. High-skill occupations are more likely to involve routine tasks in countries with lower GDP per capita than higher-income countries (Lewandowski et al. 2019). Middle-skill occupations have similar levels of routine tasks across countries' income levels. Computer use and higher levels of education in a country are associated with less routine tasks within occupations. Differences in countries' occupational structures explain only a small share of countries' differences in tasks (Lewandowski et al. 2019).

Soft versus hard skills form another important distinction in the global literature. Soft skills, often referred to as socio-emotional skills or non-cognitive skills, include aspects like being hard-working or empathetic (Heckman and Kautz 2012). These soft skills can be quite important in the labour market (Cabus, Napierala, and Carretero 2021; Heckman and Kautz 2012). In the United States, from 1980-2012, soft skills have become increasingly important as occupations requiring such skills grew rapidly and occupations that were less soft skill intensive shrank (Deming 2017). Modern production technologies, cognitive skills, and soft skills act as complements and garner higher wages (Deming and Kahn 2018). In developing countries, there is limited evidence on the returns to soft skills, but the few studies show significant returns to some soft skills, with variation across countries in which skills and the magnitude of returns to soft skills relative to cognitive skills (Campos-Vazquez 2018; Diaz, Arias, and Vera 2016; Krishnakumar and Nogales 2020). Returns to soft skills generally and specific skills may also vary by gender (Ajayi et al. 2022).

There are a variety of policy responses to supporting the labour market in the face of technological change. One approach is trying to prevent technological change (Schlogl and Sumner 2018), but given the many upsides to technology and the difficulties of preventing technological change in a global world, this approach is not recommended. Policy approaches that try to adapt the skills of the labour force are common. Education and retraining can try to shift skills away from routine tasks that can be automated. Trying

to predict what specific skills will not be automated and the costs of such investments may, however, be difficult for developing countries (Schlogl and Sumner 2018).

CHAPTER 2 Research on Skills in MENA and Egypt

Historically, MENA education systems, including in Egypt, provided the credentials demanded for public sector employment (Assaad, Krafft, and Salehi-Isfahani 2018; Salehi-Isfahani 2013). Countries remain stuck in a "**credentialist equilibrium**," with limited and weak signals of skill demand from the private sector reaching students, parents, or policymakers (Assaad, Krafft, and Salehi-Isfahani 2018). A limited number of high-skilled jobs also is an issue in MENA, including specifically Egypt (Dimova and Stephan 2020). These weak signals of skills demand from employers in turn limit the ability of stakeholders to demand relevant skills of educational institutions. Skills mismatch is the result of the credentialist equilibrium. Employers in Egypt simultaneously underscore a lack of skilled labour as a constraint to growth and note that the skills graduates have are not the skills the private sector requires (Loewe et al. 2013).

Low returns to education in MENA, including Egypt, may be due to limited or less-demanded skills being conferred by the education system, as well as weak demand for education and skills overall in the labour market (Krafft 2018; Krafft, Branson, and Flak 2019; Salehi-Isfahani, Tunali, and Assaad 2009; World Bank 2008). Low returns to specifically technical and vocational education and training (TVET) are an issue in MENA labour markets, including Egypt (Dimova and Stephan 2020; Krafft 2018). Egyptian youth face higher returns to investing in apprenticeships to gain craft skills compared to technical secondary education (Krafft 2018). Difficulties keeping the TVET system up to date and providing hands-on training may limit the ability of such systems to deliver in-demand skills (Krafft 2012). Models such as apprenticeships may better respond directly to labour demand.

Limited nationally representative data on the skills required by employers or acquired by workers constrains understanding current, much less future skill demand in **MENA or Egypt specifically**. A recent study of skill demand in 42 countries included zero MENA countries (Lewandowski et al. 2019). Egypt is adding measures of skills for both current workers and vacancies to the Employment, Wages, and Hours of Work (EWHW) Survey, surveying firms (establishments) but the data and report are not yet publicly available. Past research on skill demand in Egypt has relied on approaches such as classifying one-digit occupations as high, middle, or low skilled (Helmy 2015). As with the global trend, there is evidence of skill demand polarization in Egypt, with middle-skill jobs disappearing (Helmy 2015).

The nationally representative **Egypt Labour Market Panel Surveys (ELMPS)** in 2012 and 2018 collected data on whether five skills were required for current workers. The most common skill required was physical fitness (68% in 2012 and 52% in 2018) (Hendy, 2022). The next most common required skill was basic literacy (51% in 2012 and 47% in 2018). The demand for technical skills decreased over time, from 36% in 2012 to 29% in 2018. Mathematics skills were increasingly required, going from 30% in 2012 to 39% in 2018. Computer skills were less commonly required and grew only slightly, from 15% in 2012 to 17% in 2018. The 2018 wave also asked about management skills (18% of jobs required), customer service skills (18% of jobs required) and foreign language skills (8%

of jobs required). Skill requirements were closely tied to the occupations of workers, and secondarily to their industries of work (Hendy, 2022).

Research examining job growth over 1996-2006 versus 2006-2017 in Egypt highlighted only a **weak relationship between job growth and skill requirements** (Assaad, Krafft, and Yassin 2020). There were no significant relationships between job growth and the educational requirements of jobs, requiring technical skills, requiring computer skills, or requiring physical fitness over 1996-2017 as a whole. In 1996-2006 there was an increase in job creation in positions requiring computer skills, but this trend disappeared in 2006-2017. While the education composition of the labour force increased skills on the labour supply side, there was not corresponding demand for skilled or educated labour (Assaad, Krafft, and Yassin 2020). As a result, around half of Egypt's workers are over-educated relative to their self-reported educational job requirements (Krafft, Branson, and Flak 2019).

As an alternative to nationally representative data, some studies and dashboards use the universe of online job postings to assess skill demand. This universe is a very select, non-representative segment of Egypt's labour market. Compared to nationally representative data, online job postings are more likely to require a bachelor's degree (91% of online postings vs. 11% of jobs nationally) (Krafft 2023). Postings are primarily for professional and managerial jobs (66% of online postings vs. 10% of jobs nationally). Postings also vastly over-represent certain industries, such as ICT (23% of online postings versus 1% of jobs nationally) (Krafft 2023).

Top 10 Demanded Skills in Online Job Postings in the Arab World

The top 10 demanded hard skills in the Arab region were accounting; finance; selling techniques; business development; key performance indicators; auditing; financial statements; customer satisfaction; purchasing; and strategic planning (UN-ESCWA 2022).

However, the top 10 demanded soft skills in the Arab region were communications; sales; management; English language; planning; operations; Arabic language; problem solving; leadership; and customer service (UN-ESCWA 2022).

While the highly selected nature of online job postings must be kept in mind, the postings do still reveal important facets of this selected segment of MENA and Egyptian labour markets. The United Nations Economic and Social Commission for Western Asia (UN-ESCWA) scraped data from nearly two million online job postings in the Arab region in 2020-2022 (UN-ESCWA 2022). An analysis of these postings demonstrated that, among online job postings in the Arab world, business-administration skills are the most demanded hard skills, and communication is the most demanded soft skill (UN-ESCWA 2022). A study that captured a random sample of online job postings in Egypt found the ten most common skills words were (in order): communication, management, Microsoft, office, team, analytical, written, solving, design, and software (Krafft 2023).

Jobs posted online in both Egypt and the Arab region were for occupations such as software developer, sales professional, call centre clerks, accountants, and other business roles (Krafft 2023; UN-ESCWA 2022). Over the 2020-2022 period, there were not clear trends in soft skills, but the hard skills experiencing increasing demand were largely consistent with the types of occupations posted online, such as accounting, finance, sales, and computer science (UN-ESCWA 2022). It must be kept in mind that these findings and trends apply only to the relatively elite, highly educated segment of the labour market. For instance, in Egypt, only 9% of the unemployed had a LinkedIn or similar profile for employers to find, underscoring the limited scope of the online postings market (Krafft 2023).

CHAPTER 3 Data

3.1 Egyptian Labour Force Survey

This study uses the data of the nationally representative **Egyptian Labour Force Survey (LFS), from 2017 to 2021**. There were **413,534 workers** in this sample. Sample weights are used throughout to generate representative statistics. A key variable in the LFS is the occupation, which is matched with O*NET skills as described below. The 2017-2019 rounds used the International Standard Classification of Occupations (ISCO)-88 coding system. The 2020-2021 rounds used the ISCO-08 coding system. Both periods have occupations coded to the four-digit level of detail.

Key worker characteristics are also observed in the LFS. The analyses assess **skills by worker sex, comparing men and women.** The analyses examine skills by workers' **occupations and industries**, describing patterns at an aggregate level. Analyses compare **new entrants** (less than five years since school exit or age 15, whichever came later) versus **experienced workers** (five or more years from school exit or age 15, whichever came later). The analyses also assess differences for workers with less than a **secondary education**, a **technical secondary education**, or **higher education**.[1]

3.2 O*NET Skills Data

This research uses the **26.2 version (February 2022) of the O*NET data,** which uses the 2019 O*NET classification system.[2] O*NET provides a variety of occupational data, including on 35 skills (e.g., persuasion, management of personnel resources), 33 types of knowledge (e.g., mathematics, psychology), and 52 abilities (e.g., written expression, manual dexterity) required by each occupation. The O*NET data are from the U.S., and the skills required for jobs may be somewhat different in Egypt. Indeed, a study of 42 countries at different levels of development demonstrated that there are substantial task differences across countries within the same occupations (Lewandowski et al. 2019). As noted, there are not yet Egyptian data available on detailed skills. The analyses thus use the O*NET data as the best indicator currently available of potential, possibly future skills in Egypt.

The O*NET uses its own classification system, but it maps to the Standard Occupational Classification (SOC) system, the U.S. occupational system (the first six digits of O*NET codes are SOC codes). A crosswalk was used to map the occupations in the LFS with ISCO-88 or ISCO-08 coding (depending on the year) to the O*NET occupations (see appendix for further details).

[1] Those with general secondary education are included with higher education, as general secondary attendees almost always go on for higher education and are a relatively small group as a terminal degree (Assaad 2010).
[2] The European Skills, Competences, Qualifications, and Occupations (ESCO) was also considered, but the detail level of the 13,890 skills did not seem to map as well as the more general and transferable O*NET skills. ESCO is also based in part on O*NET.

The O*NET data on the skills for each occupation are based on the reports of occupational analysts (Burgoyne, Reeder, and Allen 2021).[3] Analysts report on the level and importance of skills. These analyst ratings are updated on a regular cycle. Inter-rater reliability among the analysts shows good consistency; for instance in the 2021 cycle of updates, the median intra-class correlation (ICC) for importance ratings of skills, across occupations, was 0.98, the mean was 0.97, and the standard deviation 0.01, and no occupation had an ICC below 0.90 (Burgoyne, Reeder, and Allen 2021). As a rule of thumb an ICC for reliability above 0.8 or 0.9 is considered good or excellent (Liljequist, Elfving, and Roaldsen 2019). Based on the data values given for importance, the analyses in this report identify the top five[4] skills, knowledge, and abilities for each occupation.[5]

3.3 Employment Projections

Based on the **LFS data** for 2017-2019[6], the analyses project the growth rate of top five skills, knowledge, and abilities. These are used to calculate and compare 2022 and 2030 projections of the percentage of employment with top five skills, knowledge, and abilities. This approach assumes that the skill requirements of a particular occupation will remain the same but captures how the changing composition of occupations will shape skill demand.

Methods

This report uses the data of the Egyptian LFS 2017-2021 to calculate the percentage of employment in Egypt that requires the various skills, abilities, and knowledge as one of their top five skills, abilities, or knowledge, based on the O*NET data. Analyses are undertaken by education level, years of work experience, for specific occupations and industries, and comparing men versus women.

[3] Analysts are sufficiently educated, trained, and experienced for the rating tasks, with additional training and detailed instructions specifically on undertaking O*NET skills ratings, as well as meeting key training and reliability benchmarks (Fleisher and Tsacoumis 2012).

[4] The selection of the top five cutoff is arbitrary, but effectively summarizes top skills, abilities, and knowledge.

[5] In cases of a tied value for importance within a category, order was randomized.

[6] 2020 and 2021 are not used due to the impact of COVID-19, particularly in 2020, potentially distorting trends, as well as the structural changes in the occupation coding in 2020.

CHAPTER 4 Results

4.1 Top Skills, Abilities, and Knowledge

Communication and other basic skills are the most common top five skills for jobs in Egypt. Figure 1 shows the percentage of employment that has each skill among the five most important skills. Active listening is a top-five skill for 93% of employment in Egypt, followed by speaking (83%), and critical thinking (68%). Social skills, such as service orientation (22%), social perceptiveness[7] (21%) and coordination (18%) are also commonly top-five skills. Technology and management skills are less common, for instance, programming is only a top-five skill for less than 1% of jobs.

Figure 1: Percentage of employment that has each skill among the five most important skills.

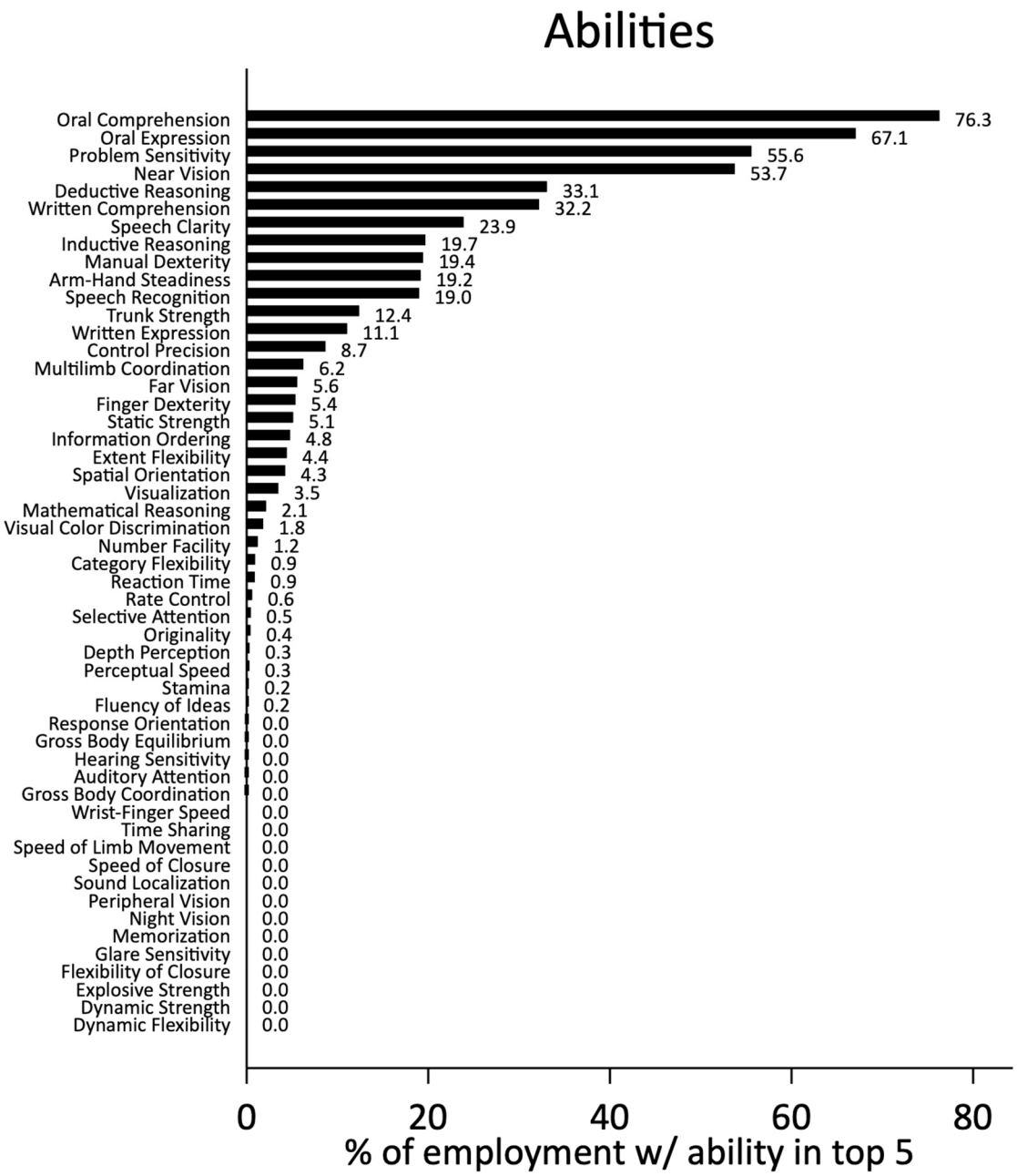
Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data.

[7] Social perceptiveness refers to being aware of and understanding others' reactions.

Verbal and reasoning abilities, as well as physical abilities, are among the top-five abilities for a sizeable share of employment in Egypt. Figure 2 shows the percentage of employment that has each ability among the top five most important abilities. Oral comprehension (76%) and oral expression (67%) are the most common top-five abilities. Problem sensitivity, recognizing problems (56%) and near vision[8] (54%) are next most common. Manual dexterity (19%), arm-hand steadiness (19%), and trunk strength (12%) are the more common top-five physical abilities.

[8] Near vision refers to the ability to see details at close range.

Figure 2: Percentage of employment that has each ability among the five most important abilities.

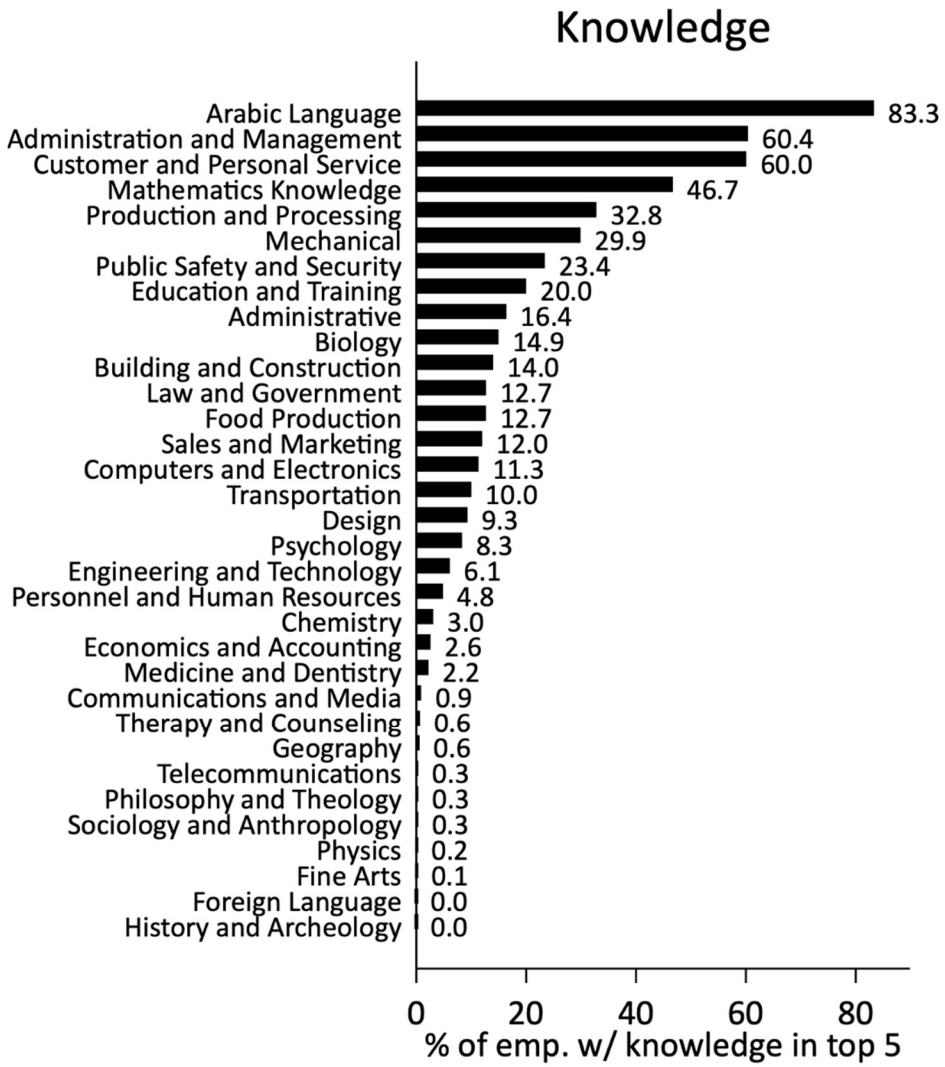


Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data

Language, management, and customer service are the most common top five types of knowledge for jobs in Egypt. Figure 3 presents the percentage of employment that has each type of knowledge among the five most important types of knowledge. Arabic

language[9] (83%) is the most common top-five skill. Administration and management (60%) and customer service (60%) are next-most common. Less common forms of knowledge in the top five (less than 1%) include communications and media, therapy and counselling, geography, telecommunications, philosophy and theology, sociology and anthropology, physics, fine arts, foreign language,[10] and history and archaeology.

Figure 3: Percentage of employment that has each type of knowledge among the five most important types of knowledge.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data

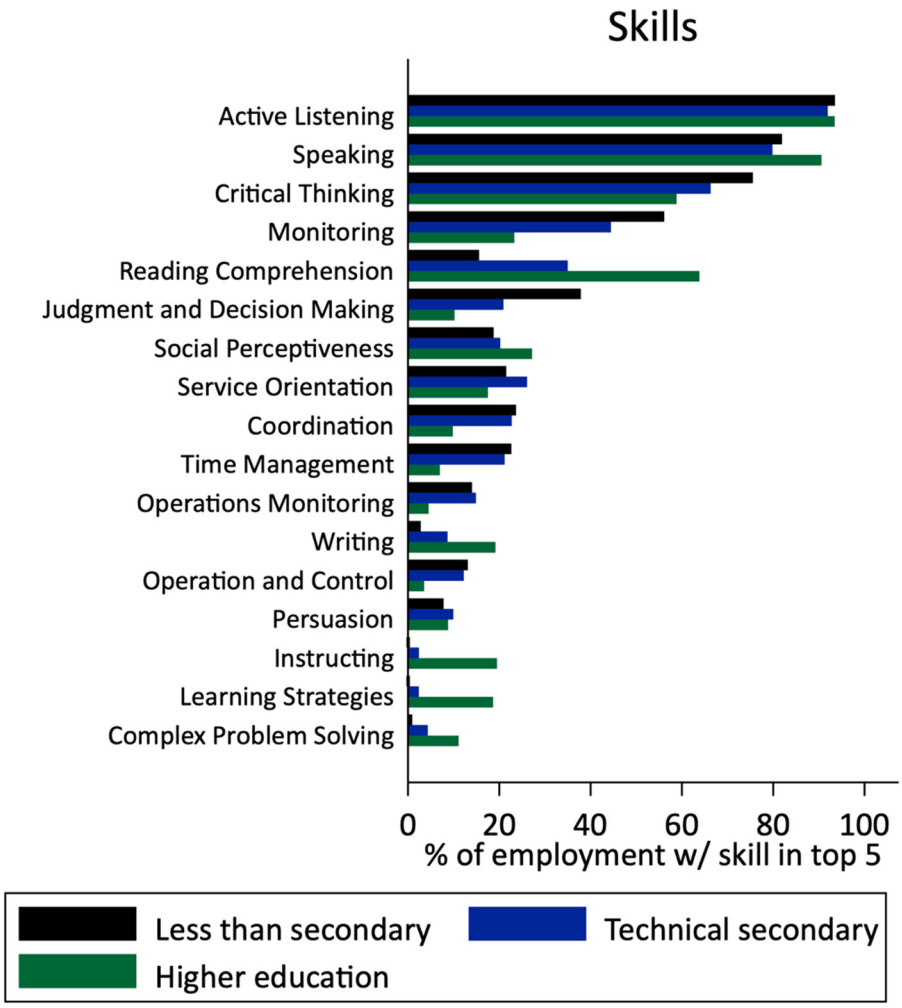
[9] In the original O*NET, for the United States, this was English language.

[10] Foreign language knowledge requirements may differ in Egypt than in the original United States setting of O*NET. In the ELMPS 2018, 8% of workers reported their job required foreign language skills (Hendy, 2022)

4.2 Top Skills, Abilities, and Knowledge by Education Level

There is **important differentiation in top-five skills by workers' education**, with particularly large differences emphasizing **basic** and **advanced communication skills** for higher education (
Figure 4). Those with higher education are particularly likely to be in jobs where reading comprehension is a top-five skill, along with speaking, active listening, instructing, learning strategies, and complex problem-solving. Those with technical secondary education are the most likely to be in jobs with a service orientation, operations monitoring, or persuasion as a top-five skill. Those with less than secondary education are the most likely to be in jobs with top five skills that include critical thinking, monitoring, judgment and decision making, coordination, time management, and operation and control.

Figure 4: Percentage of employment that has each skill among the five most important skills, by education level.

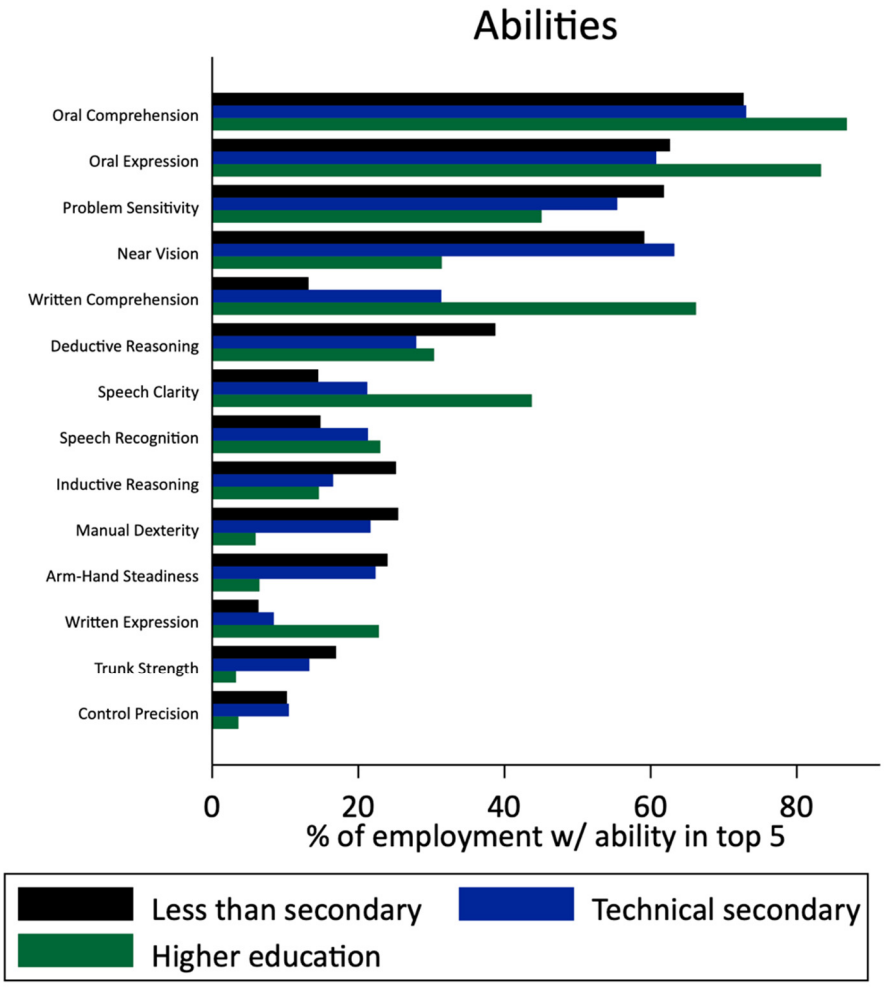


Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data

Notes: displaying categories where 10% or more in one group have in the top five

The role of communication for work done by higher education graduates is reflected in the abilities for their jobs as well (Figure 5), while less educated workers engage in jobs with key physical abilities. Those with higher education are the most likely to be in jobs with top-five abilities of oral comprehension, oral expression, written comprehension, speech clarity, speech recognition, and written expression. Those with technical secondary education are particularly likely to have top five abilities in their jobs of near vision and control precision. Those with less than secondary education are particularly likely to be in jobs with top five abilities of problem sensitivity, deductive reasoning, inductive reasoning, manual dexterity, arm hand steadiness, and trunk strength.

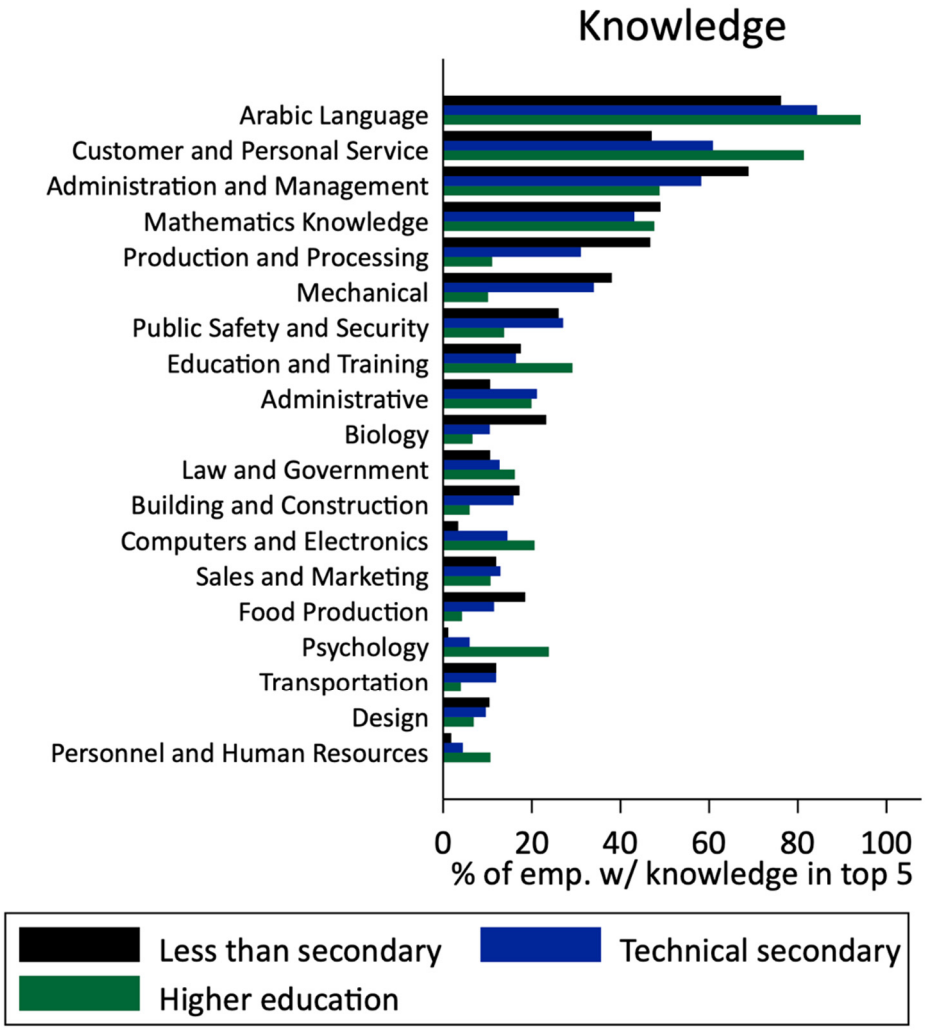
Figure 5: Percentage of employment that has each ability among the five most important abilities, by education level.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five

The top-five types of knowledge depend upon workers' education (Figure 6), with higher education graduates particularly in jobs requiring service-oriented knowledge, while less educated workers are in jobs requiring mechanical and production knowledge. Higher education graduates are particularly likely to be in jobs that require Arabic language, customer service, education and training, law and government, computers and electronics, psychology, or personnel and human resources knowledge. Technical secondary graduates are the most likely to be in jobs requiring public safety and security, administrative, or sales and marketing knowledge. Less than secondary graduates are particularly likely to be in jobs with top-five knowledge of administration and management, mathematics, production and processing, mechanicals, biology, building and construction, food production, and design.

Figure 6: Percentage of employment that has each type of knowledge among the five most important types of knowledge, by education level.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five

4.3 Top Skills, Abilities, and Knowledge for New Entrants versus Experienced Workers.

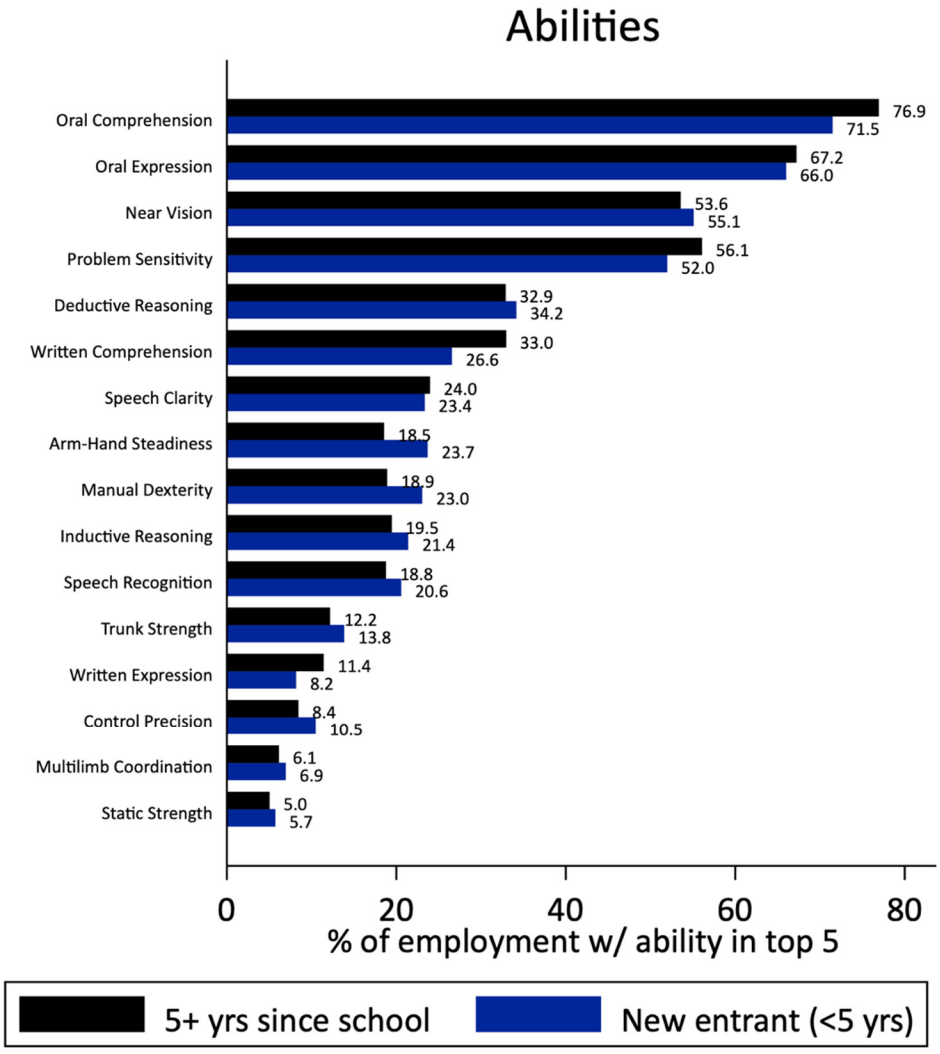
New entrants, who left school (or turned 15, whichever is later) within the past five years have **similar top skills** to workers five or more years from school exit (Figure 7). New entrants are slightly more likely to be in jobs with monitoring, judgment and decision making, service orientation, coordination, operations monitoring, and persuasion skills in the top five. Workers further from school exit are slightly more likely to be in jobs with top five skills of active listening, speaking, critical thinking, reading comprehension, social perceptiveness, time management, and operation and control.

Figure 7: Percentage of employment that has each skill among the five most important skills, new entrants versus experienced workers.

Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five

There are moderate differences in top five abilities by workers' time since school exit (Figure 8), with new entrants in jobs with more physical abilities and older workers in jobs with communication abilities. New entrants are particularly likely to be in jobs with top five physical abilities, including near vision, arm-hand steadiness, manual dexterity, trunk strength, control precision, multi-limb coordination, and static strength, as well as speech recognition, deductive and inductive reasoning. Workers further from school exit are more likely to be in jobs with top abilities of oral comprehension, oral expression, problem sensitivity, written comprehension, speech clarity, and written expression.

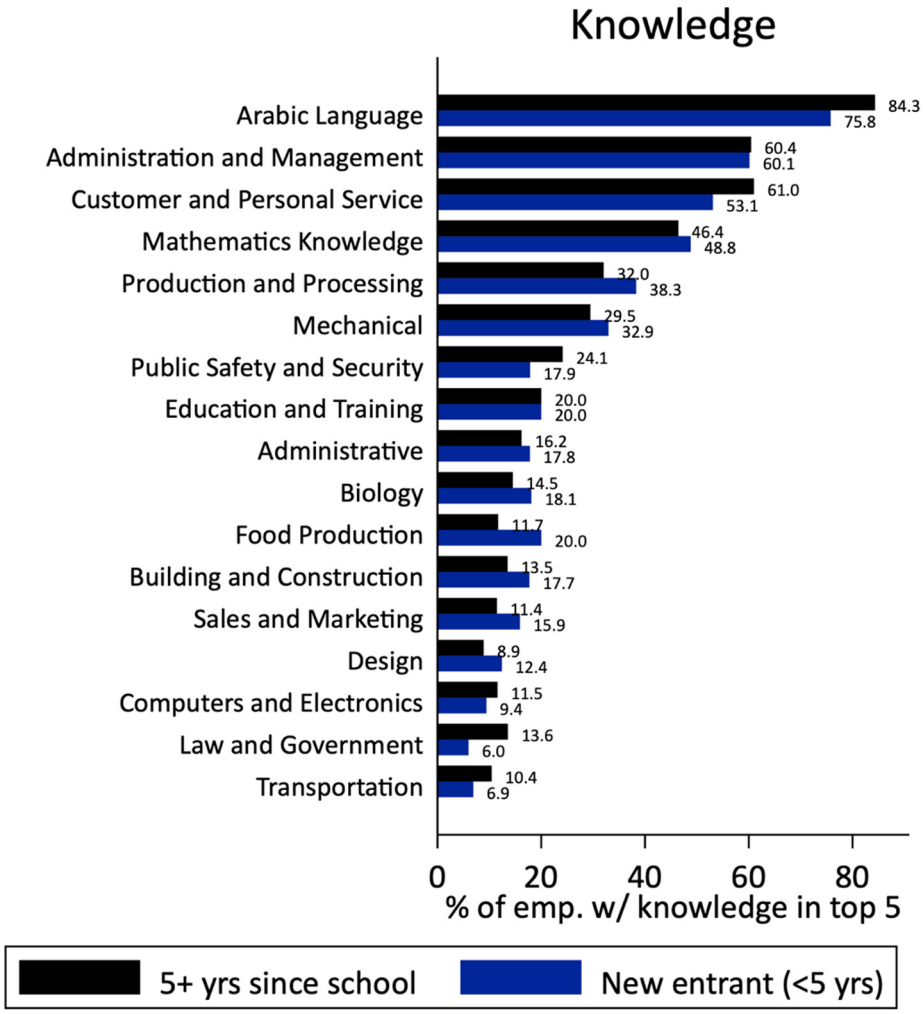
Figure 8: Percentage of employment that has each ability among the five most important abilities, new entrants versus experienced workers.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five

There are only modest differences in the top five types of knowledge for new entrants versus older workers (Figure 9), without a clear overall pattern. New entrants are particularly likely to be in jobs with top five knowledge of mathematics, production, mechanical, administrative, biology, food production, building and construction, sales and marketing, and design. Workers further from school exit are particularly likely to be in jobs with top knowledge of Arabic language, administration and management, customer and personal service, public safety and security, computers and electronics, law and government, and transportation.

Figure 9: Percentage of employment that has each type of knowledge among the five most important types of knowledge, new entrants versus experienced workers.

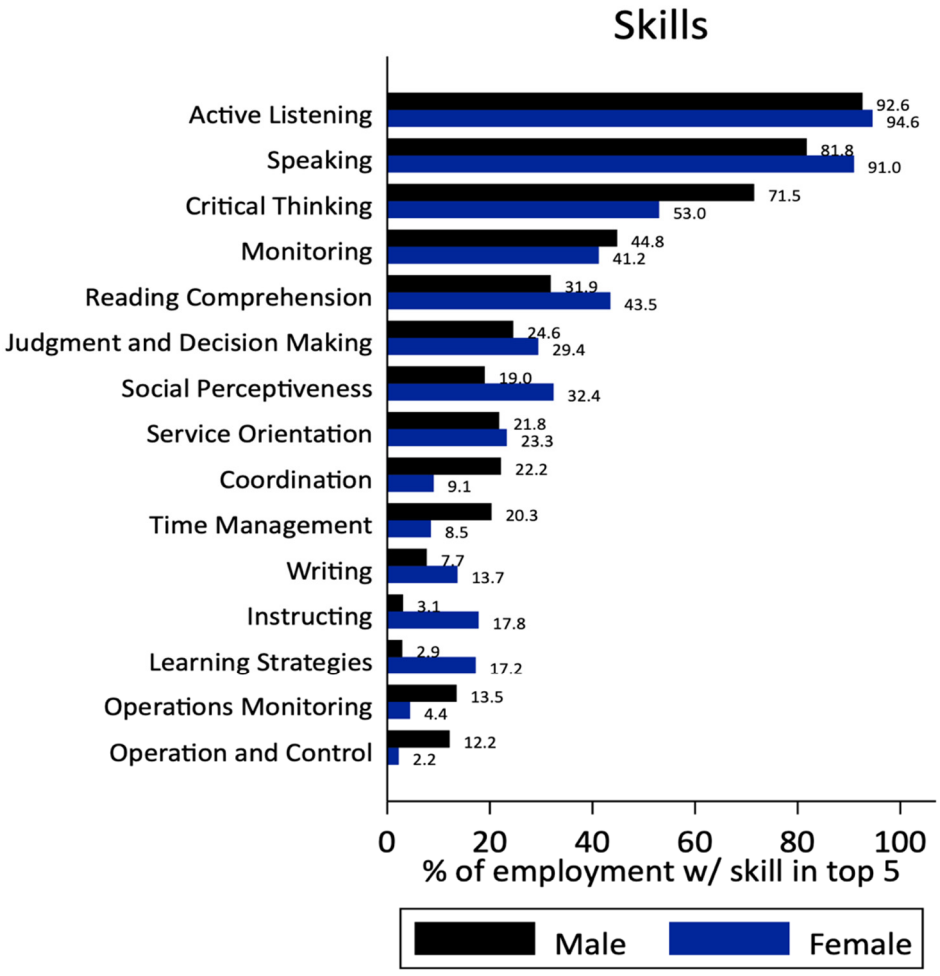


Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five

4.4 Top Skills, Abilities, and Knowledge for Jobs Held by Men Versus Women

There are differences in the top five skills men and women use in employment (Figure 10), which largely reflect **gendered occupational segregation**, such as women concentrated in teaching jobs. Women are more often working in jobs with active listening, speaking, reading and writing, judgment and decision making, social, service, and teaching skills in the top five. Men are more often working in jobs with critical thinking, monitoring, coordination, time management, operations monitoring, and operation and control skills in the top five.

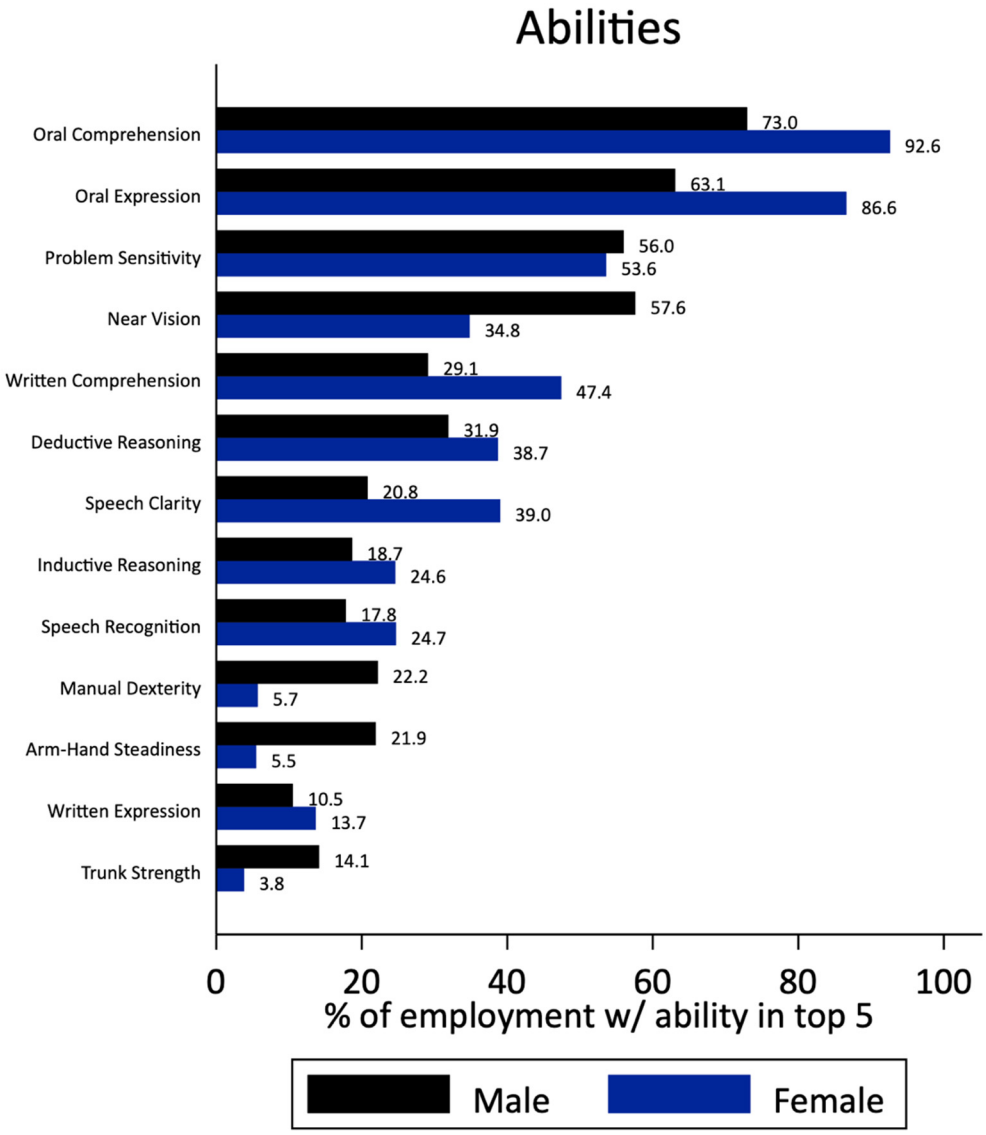
Figure 10: Percentage of employment that has each skill among the five most important skills, by sex.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five

Verbal, written, and reasoning abilities are more common among the top-five abilities for **women** than men (Figure 11). For instance, 47% of women are in a job where written comprehension is a top-five ability, compared to 29% of men. Men, more often than women, have jobs that require physical abilities in the top five, such as near vision (58% men, 35% women) and manual dexterity (22% men, 6% women).

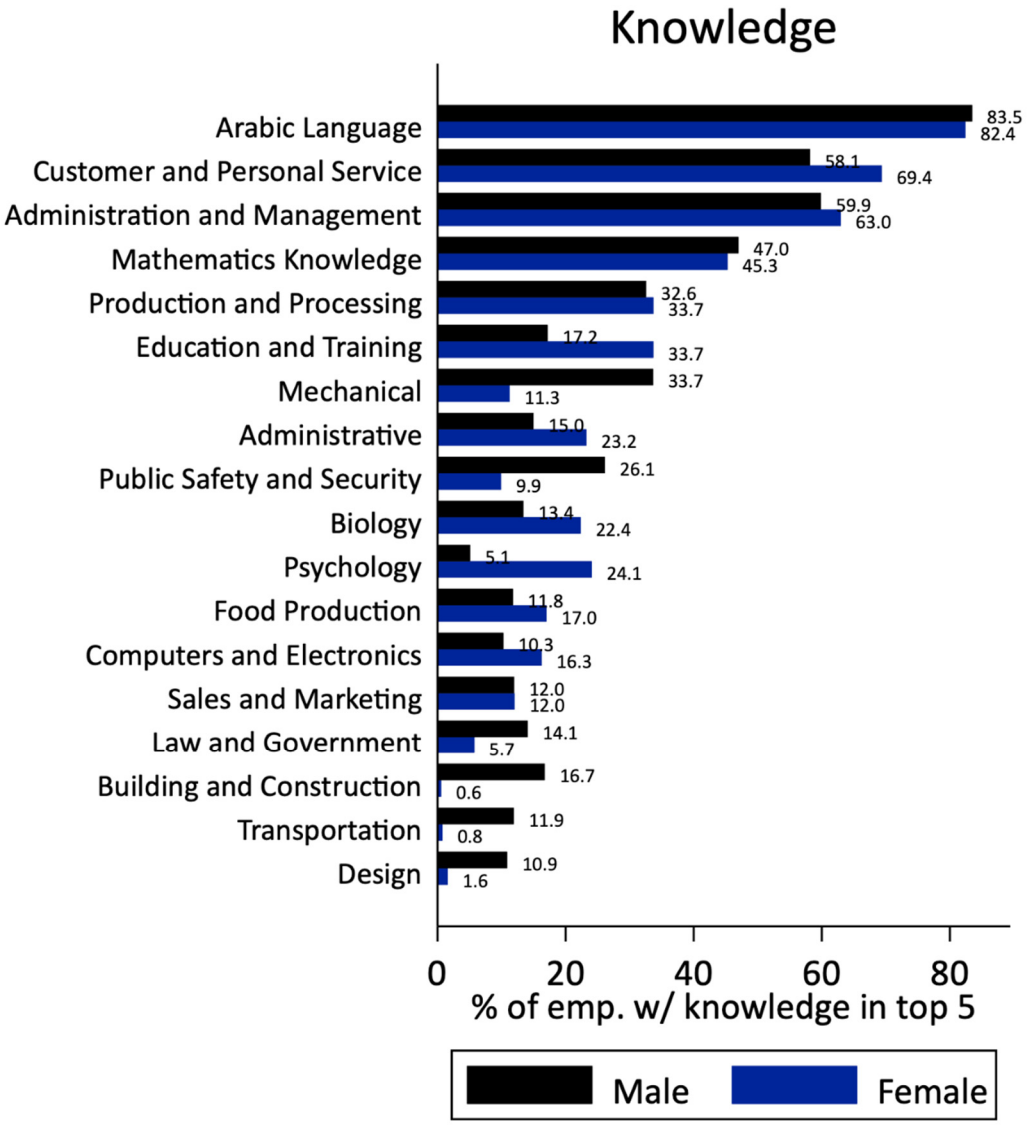
Figure 11: Percentage of employment that has each ability among the five most important abilities, by sex.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five

The differences in the top-five knowledge between men and women's employment (Figure 12) emphasize the service and care orientation of women's work. Women are particularly more likely to be in jobs with top-five knowledge of customer and personal service, administration and management, education, administration, and psychology. Men are particularly more likely to be in jobs with top-five knowledge of mechanical, public safety and security, law and government, construction, transportation, and design.

Figure 12: Percentage of employment that has each type of knowledge among the five most important types of knowledge, by sex.

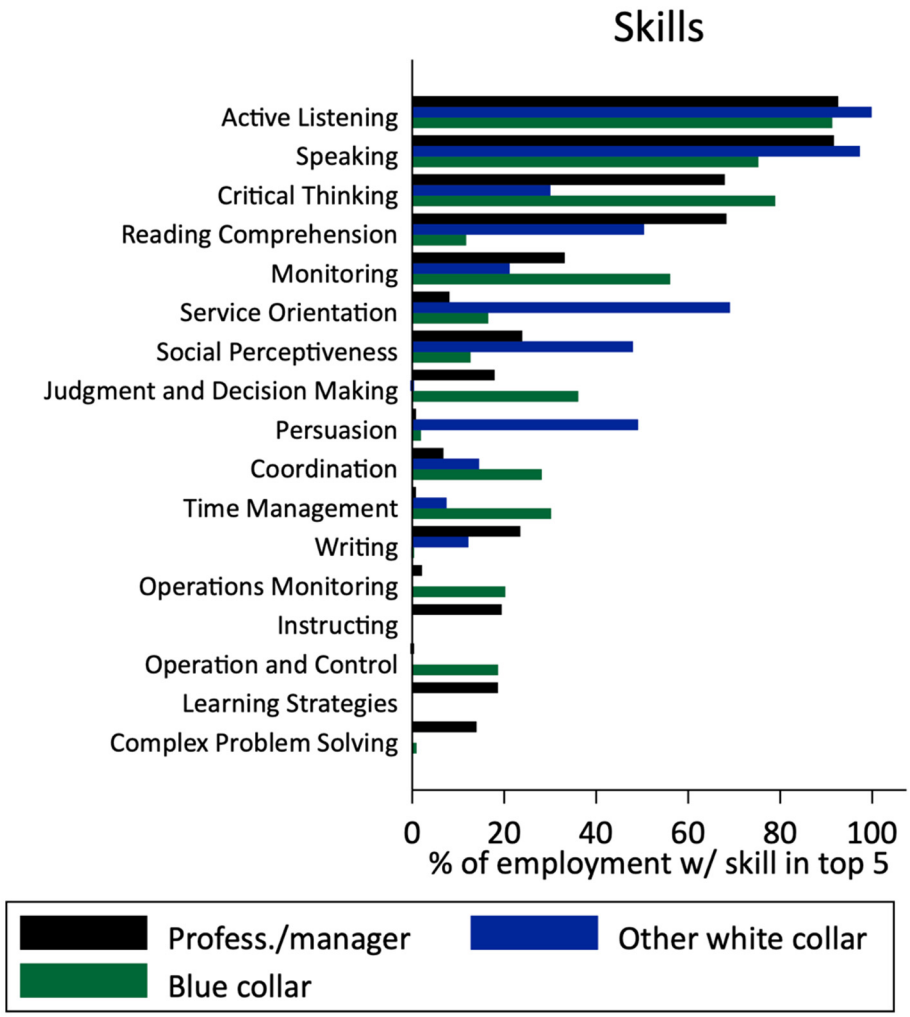


Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five

4.5 Top Skills, Abilities, and Knowledge for Different Occupations

The top five skills of jobs vary across occupations, reflecting the **different tasks and requirements of each occupation (**Figure 13). Blue collar jobs are particularly likely to have top five skills that include critical thinking, monitoring, judgment and decision making, coordination, time management, operations monitoring, and operation and control skills. Professional and managerial jobs are particularly likely to require reading comprehension, writing, instructing and learning strategies, and complex problem solving. Other white-collar jobs (e.g., clerks, sales and service) are particularly likely to have top five skills of active listening, speaking, service orientation, social perceptiveness, and persuasion.

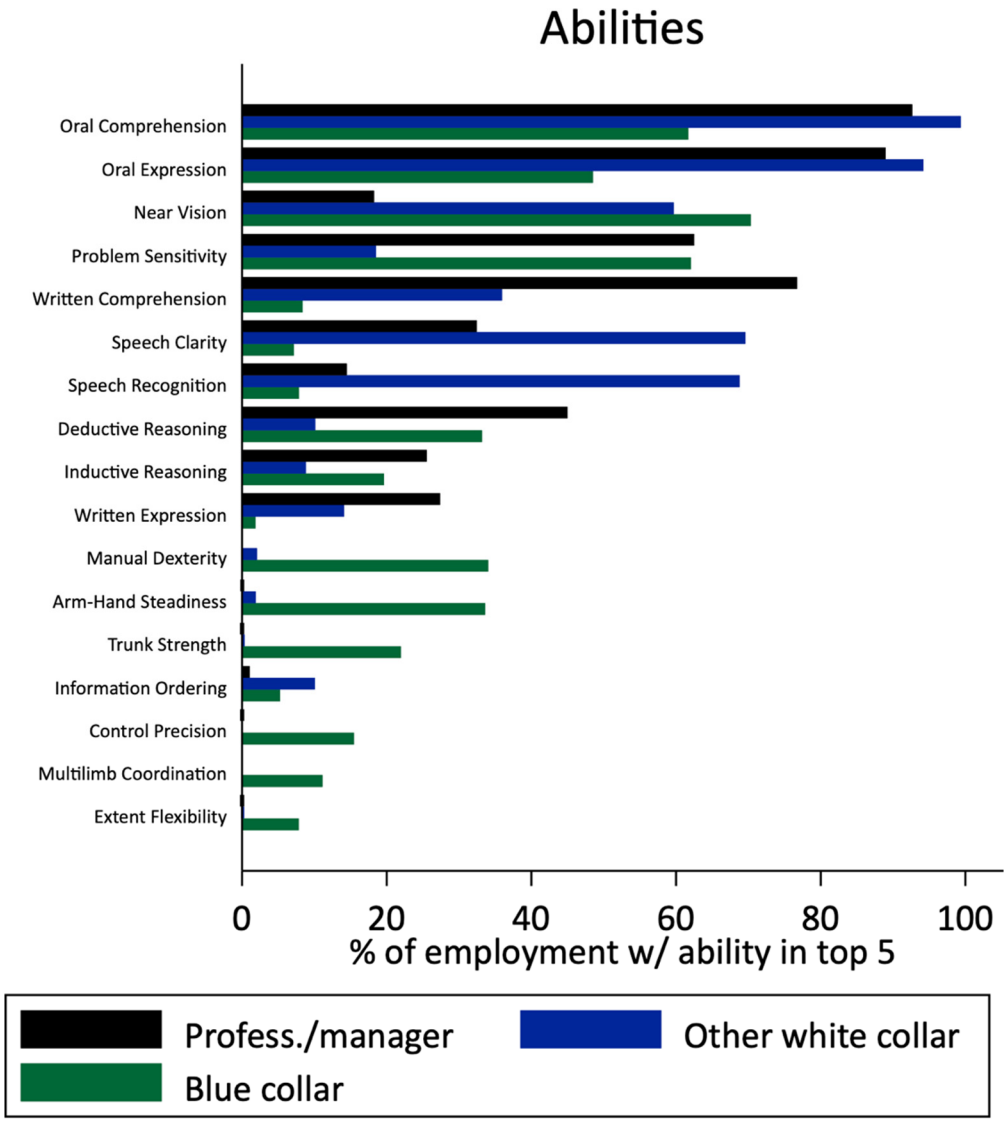
Figure 13: Percentage of employment that has each skill among the five most important skills, by occupation.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five

Some of the strongest differences in terms of abilities are by occupation, particularly **comparing blue collar to other occupations** (Figure 14). Blue collar occupations are much less likely to have top five abilities of oral communication, and much more likely to have top five abilities of various physical abilities. Comparing professional/managerial and other white-collar occupations, professional/managerial occupations have the most top five written and reasoning abilities. Other white-collar occupations have the most top five speech abilities.

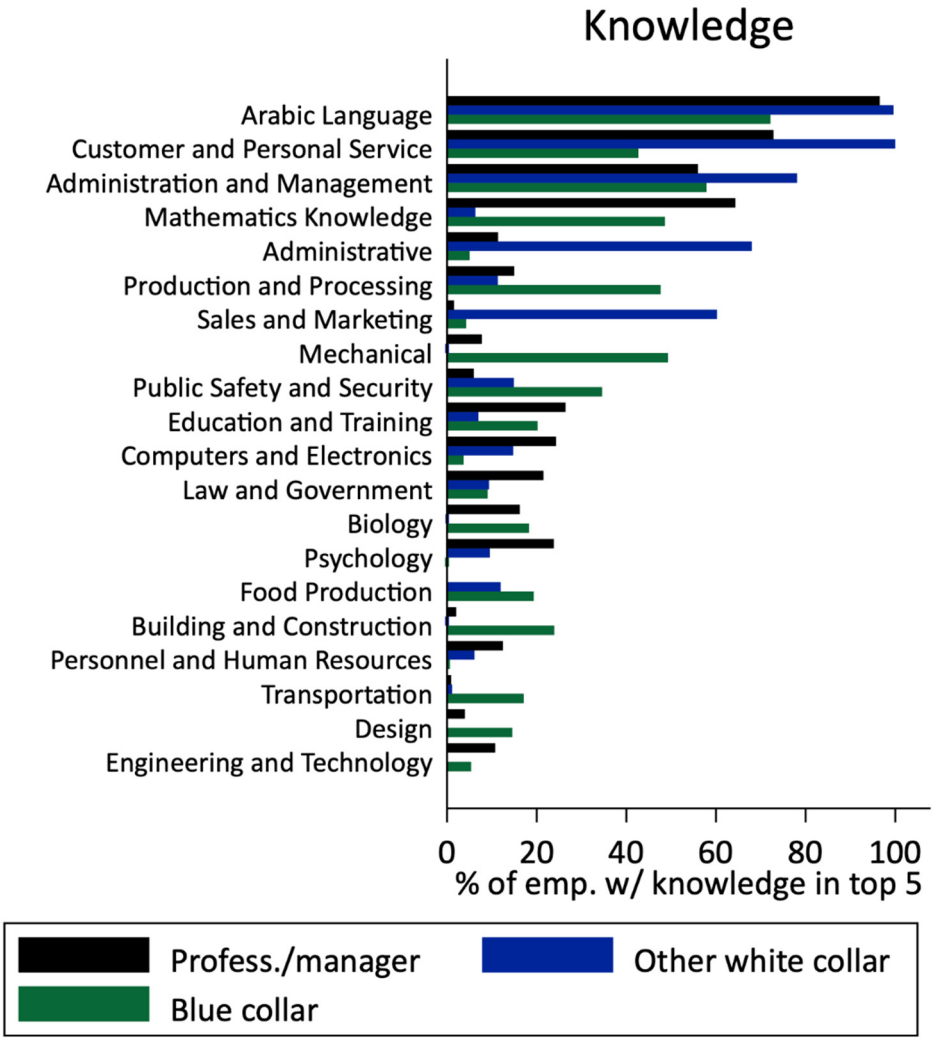
Figure 14: Percentage of employment that has each ability among the five most important abilities, by occupation.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five

Knowledge differences are substantial across occupations (Figure 15), reflecting the different knowledge bases for different types of work. Blue collar jobs are particularly likely to have in the top five production, mechanical, public safety, food production, building and construction, transportation, and design knowledge. Professional and managerial jobs are particularly likely to have top five mathematics knowledge, education and training, computers and electronics, law and government, psychology, personnel and human resources, and engineering and technology knowledge. Other white-collar jobs are particularly likely to have top five Arabic language, customer service, administration and management, administrative, and sales and marketing knowledge.

Figure 15: Percentage of employment that has each type of knowledge among the five most important types of knowledge, by occupation.

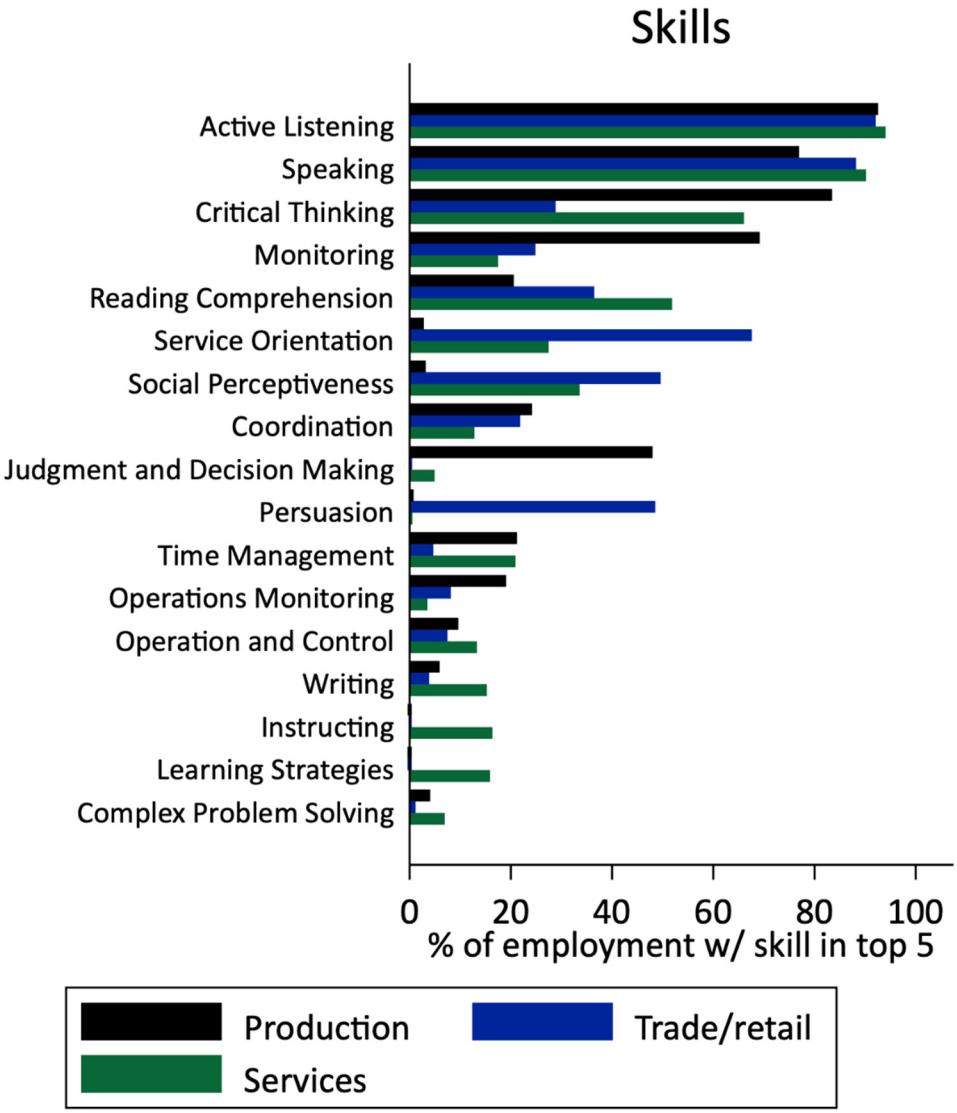


Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five

4.6 Top Skills, Abilities, and Knowledge for Different Industries

Skills **vary substantially by industry** (Figure 16), reflecting the different types of work undertaken across firms. Production is less likely to require speaking than services or trade/retail. Both production and services require a substantial share of critical thinking, while trade/retail has a particularly high share of jobs with service orientation and persuasion. Production is particularly likely to have top five skills such as monitoring and judgment and decision making. Services are particularly likely to require reading, writing and instructing skills.

Figure 16: Percentage of employment that has each skill among the five most important skills, by industry.

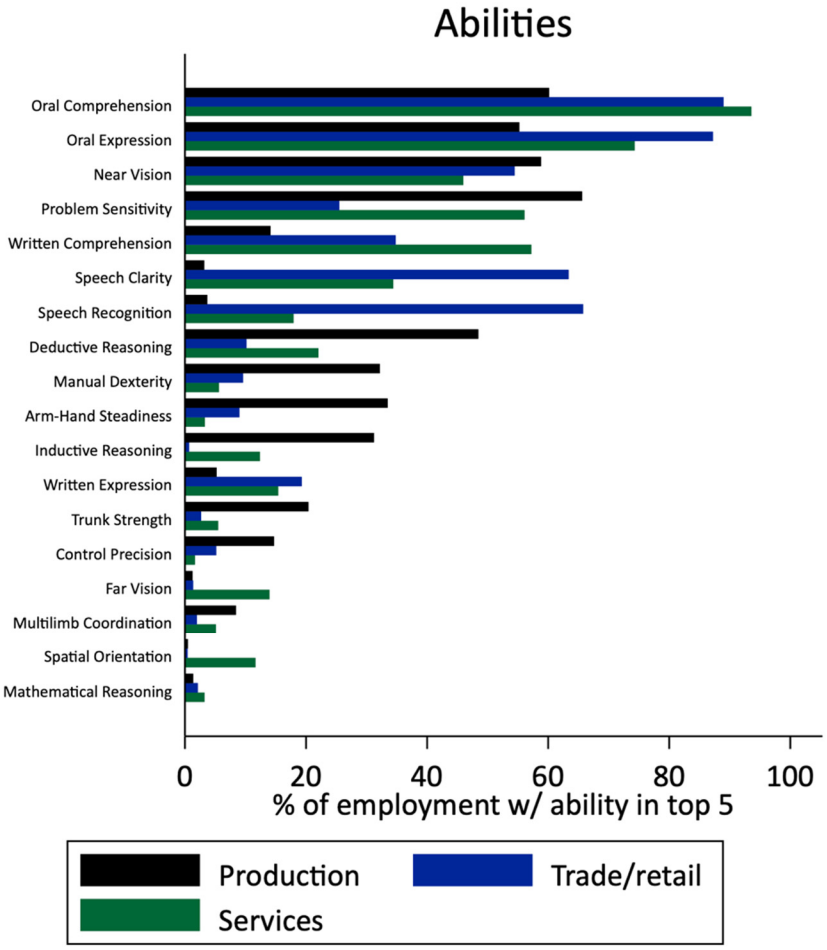


Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five. Production includes agriculture, mining, manufacturing, utilities, and construction. Trade/retail includes

wholesale and retail trade and accommodation and food services. Services include information and communication, financial and insurance activities, real estate, public administration, education, health, and other activities.

Top abilities vary substantially by industry (Figure 17), with retail and services emphasizing communication and production requiring physical abilities. Oral comprehension and expression are almost always in the top five for trade and retail and services, but not production. Production has in its top abilities particularly high rates of physical abilities, both dexterity and strength. Services are particularly likely to require writing abilities.

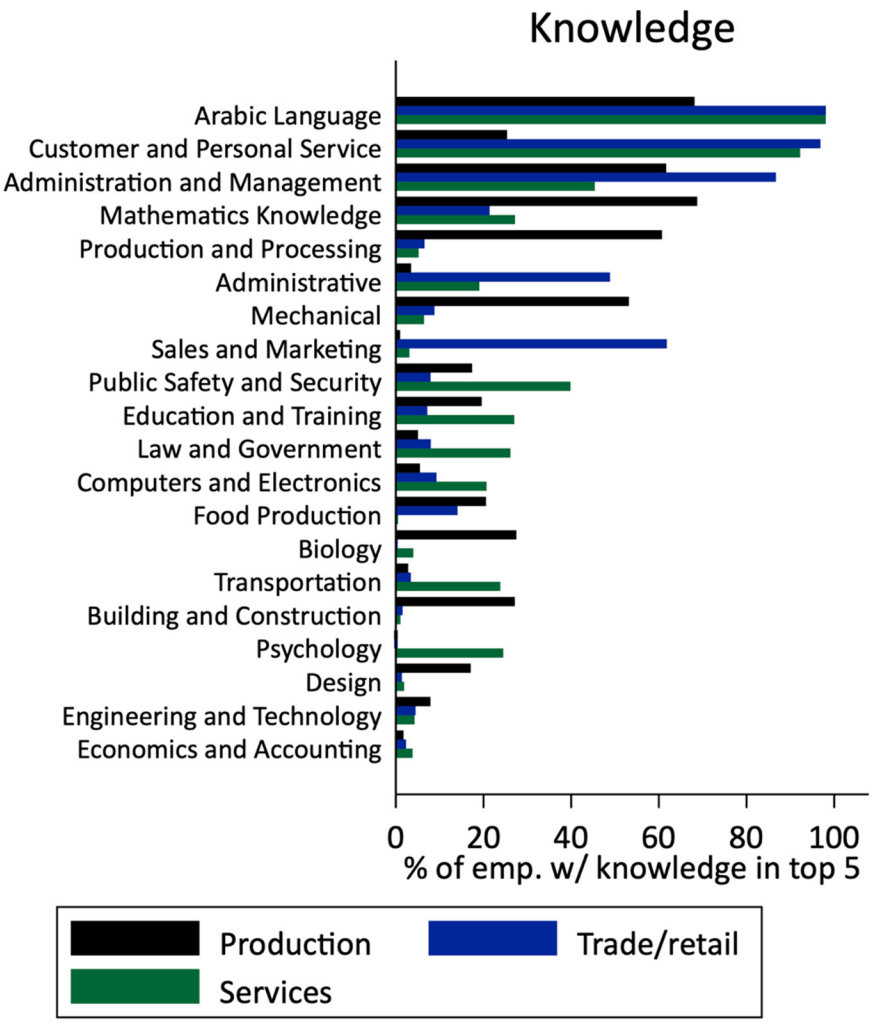
Figure 17: Percentage of employment that has each ability among the five most important abilities, by industry.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five. Production includes agriculture, mining, manufacturing, utilities, and construction. Trade/retail includes wholesale and retail trade and accommodation and food services. Services include information and communication, financial and insurance activities, real estate, public administration, education, health, and other activities.

Certain types of **knowledge** are closely linked to **particular industries** (Figure 18), such as business knowledge for retail. Jobs in retail are particularly likely to have top five administrative, sales and marketing knowledge. Jobs in production are particularly likely to have production and processing, mechanical, and mathematics knowledge. Services are particularly likely to have public safety and security, education and training, law and government, computers and electronics, and psychology knowledge, reflecting the diversity of services in the economy.

Figure 18: Percentage of employment that has each type of knowledge among the five most important types of knowledge, by industry.

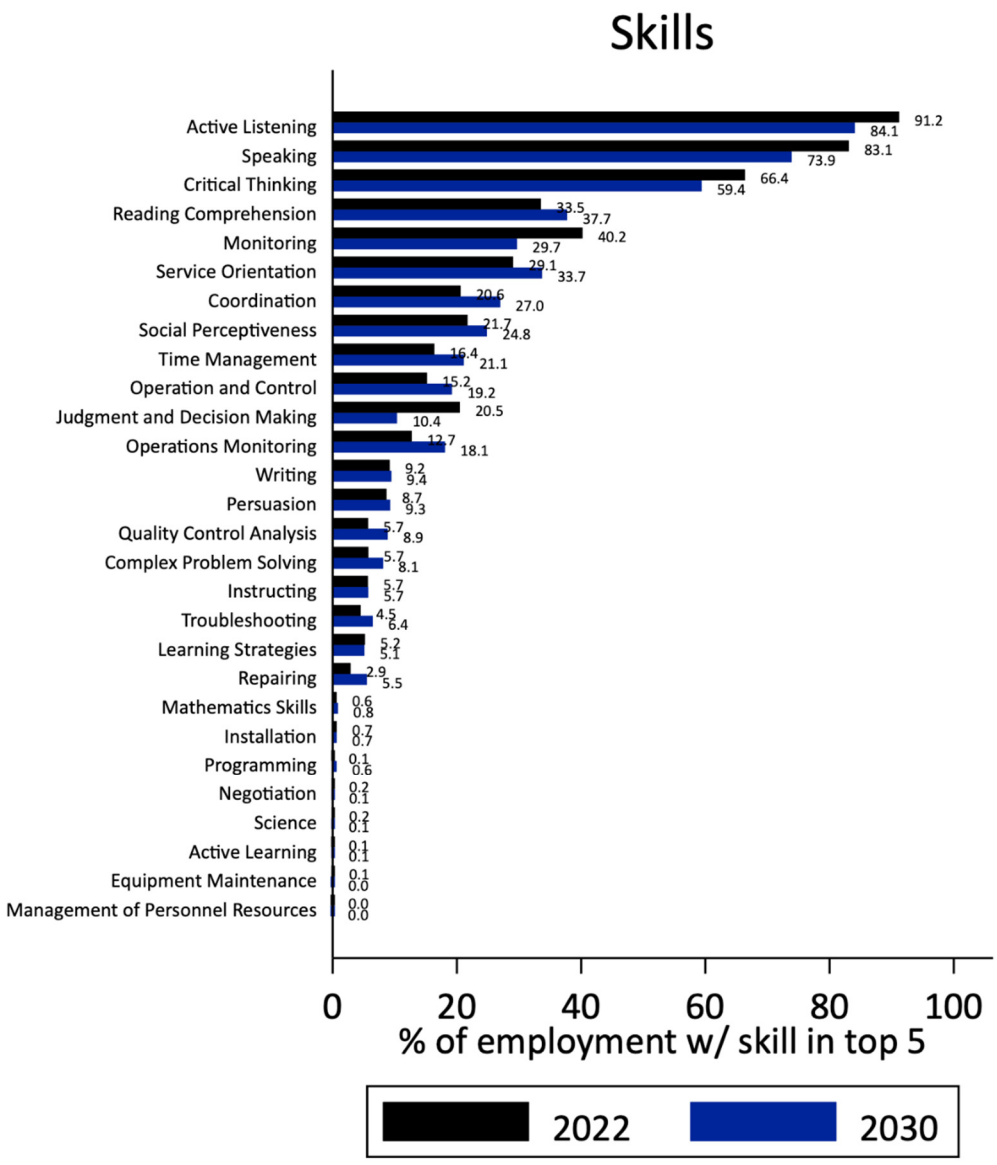


Source: Author's calculation based on O*NET 26.2 and LFS 2017-2021 data
Notes: displaying categories where 10% or more in one group have in the top five. Production includes agriculture, mining, manufacturing, utilities, and construction. Trade/retail includes wholesale and retail trade and accommodation and food services. Services include information and communication, financial and insurance activities, real estate, public administration, education, health, and other activities.

4.7 Top Skills, Abilities, and Knowledge in 2022 and 2030 Employment Projections

Trends in skills will increase the importance of social skills, while communication and critical thinking skills will diminish but remain central. Figure 19 presents the top five skills for employment in 2022 and 2030, based on the employment projections. These analyses are driven by the changing structure of occupations in the Egyptian economy, since we do not know how skills within occupations will change over time. Skills are becoming slightly more specialized over time, with the three most common top five skills in 2022 (active listening, speaking, and critical thinking) remaining very, but slightly less, central. Increases from 2022 to 2030 in key skills include **reading comprehension** (34% to 38%), **service orientation** (29% to 34%), **coordination** (21% to 27%), **social perceptiveness** (22% to 25%), **time management** (16% to 21%) and **operations monitoring** (13% to 18%). Other substantial increases in less common skills include **quality control analysis** (6% to 9%), **complex problem solving** (7% to 11%), and **repairing** (3% to 6%). **Programming skills** are projected to grow very rapidly, but from a very low base, going from a top-five skill for 0.1% of jobs in 2022 to 0.6% in 2030.

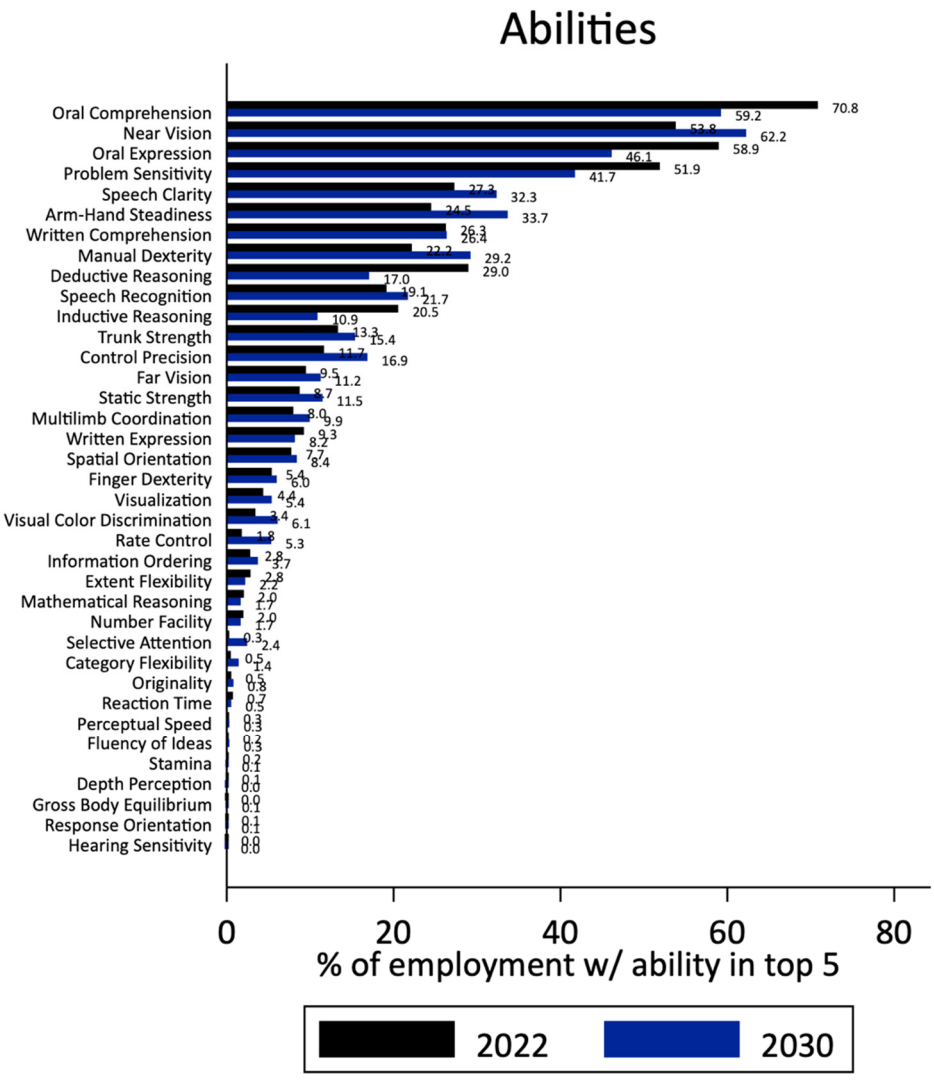
Figure 19: Percentage of employment that has each skill among the five most important skills, employment projections for 2022 and 2030.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2019 data and growth rates
Notes: Excluding skills not in the top five.

Communication abilities will remain key through 2030, but the types of physical abilities needed will shift. Figure 20 presents the 2022 and 2030 abilities projections. There is a large jump in **near vision** as a key top five ability, from **53% to 62%.** Oral comprehension and expression abilities, along with problem sensitivity, remain important but diminish, while speech abilities increase. There are notable predicted increases in arm-hand steadiness, manual dexterity, and control precision.

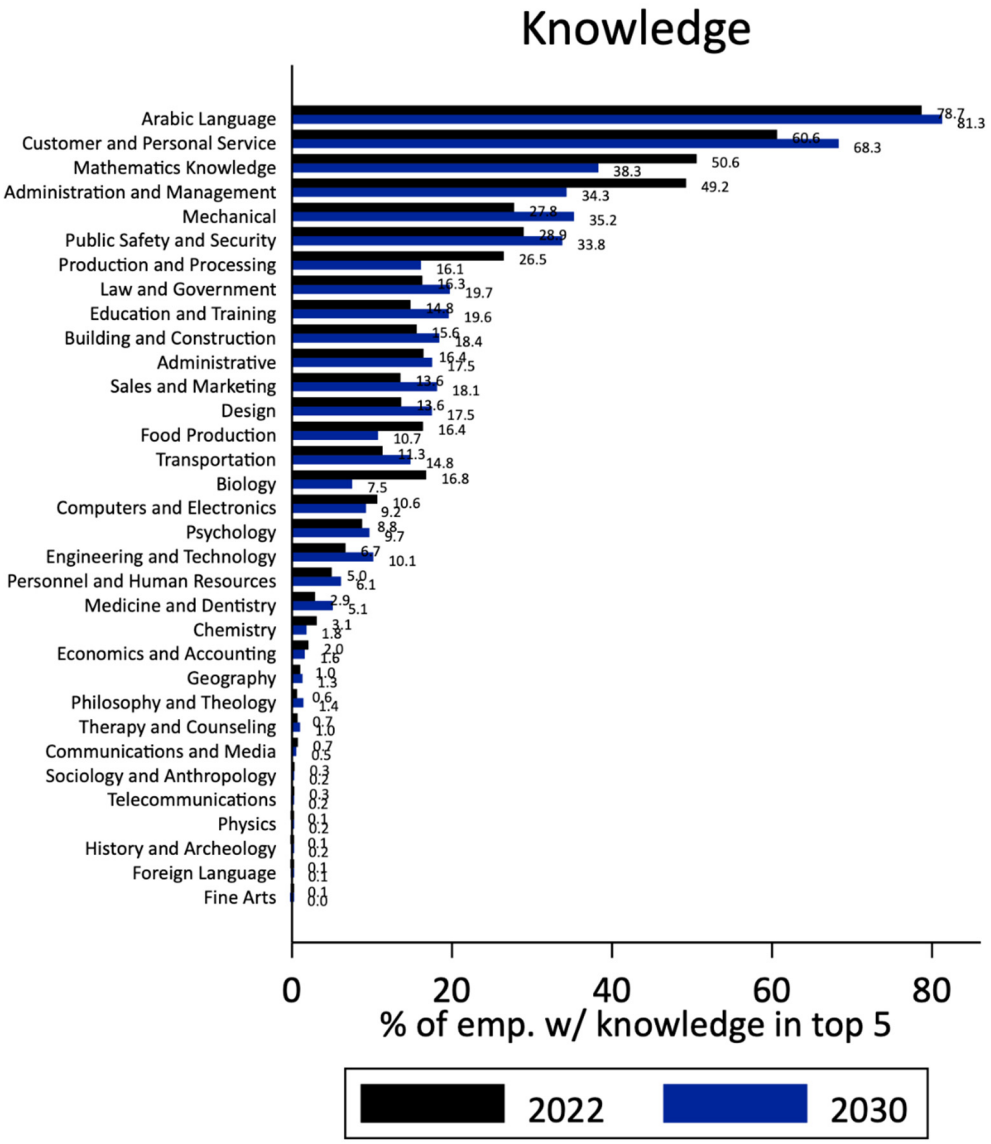
Figure 20: Percentage of employment that has each ability among the five most important abilities, employment projections for 2022 and 2030.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2019 data and growth rates
Notes: Excluding abilities not in the top five.

Knowledge shifts emphasize communication and service knowledge. Figure 21 presents top five knowledge, for the 2022 and 2030 employment projections. **Arabic language** and especially **customer and personal service knowledge** (from 60% to 68%) will increase in importance. Administration and management will become less central, while public safety and security more so. **Mechanical knowledge** will increase from 28% to 35%, reflecting the growth of construction, while production and processing will fall from 26% to 16%.

Figure 21: Percentage of employment that has each type of knowledge among the five most important types of knowledge, employment projections for 2022 and 2030.



Source: Author's calculation based on O*NET 26.2 and LFS 2017-2019 data and growth rates
Notes: Excluding knowledge not in the top five.

CHAPTER 5 Conclusions

5.1 Key Patterns of Skills, Abilities, and Knowledge

Physical and communication skills, abilities, and knowledge are key for workers in Egypt's labour market, as these analyses show. Based on these analyses, the most common skill among the top five for workers was **active listening** (93%), the most common top five **ability was oral comprehension** (76%), and the most common top five knowledge was **Arabic language** (83%), underscoring the importance of communication in the labour market. Past research using the responses of workers on the skills their jobs require in the ELMPS 2018 also corroborates the centrality of physical and basic literacy skills as required for nearly half of workers' jobs (Hendy, 2022).

The types of skills, abilities, and knowledge central to work depended on the type of work and were also related to workers' demographic characteristics. There were moderate differences in the top skills, abilities, and knowledge of men's and women's jobs. These differences largely reflect occupational gender segregation in the Egyptian labour market (El-Hamidi and Said 2014). For instance, women are disproportionately in public sector administration roles, working as teachers, or in the care economy (Assaad, AlSharawy, and Salemi 2022; Barsoum and Abdalla 2022). Blue collar jobs are much more likely to be held by men then by women (Assaad, AlSharawy, and Salemi 2022), and that is reflected in their top skills, abilities, and knowledge.

The differences in top skills, knowledge, and abilities show **educational distinctions**, particularly between those with a **less than secondary education**, whose jobs are more physical, and those with higher education, whose skills are more specialized and demand higher levels of communication. Technical secondary graduates largely fell at a point between the less educated and higher education graduates in terms of their key skills, knowledge, and abilities; there were few cases where technical secondary graduates were more likely to have a key skill, ability, or knowledge than the other two education groups. There were not large differences between new entrants and older workers. The small differences emphasized that new entrant jobs were more likely to require physical abilities.

Variations in key skills, knowledge, and abilities by occupation and industry were sizeable and illustrate the different skills required for different jobs. Monitoring production and physical abilities were key in the production industries and blue-collar occupations. Business and related skills, abilities, and knowledge were central in trade and retail, while services relied on more specialized skills as well as higher-order communication skills. Consistent with the results of these analyses, communication and business skills were identified as the most in-demand among online job postings in the Arab world (UN-ESCWA 2022).

Projections for skills in 2022 and 2030 tracked the shifting structure of the economy. Projections used growth rates for skills, knowledge, and abilities from 2017-2019 in the LFS to project future trends. Changes over the eight-year period were modest, with top

skills, abilities, and knowledge, shifting only slightly. In light of a shrinking manufacturing sector (Assaad et al. 2019), there will be fewer jobs with key production skills, but more transport and construction-related skills, as well as more service-oriented skills.

5.2 Limitations and Areas for Future Research

The analyses of future top skills, abilities, and knowledge were based on a U.S. database – **the O*NET**, combined with Egypt's LFS. Previous research has demonstrated that the skill content of occupations is not the same across countries; it particularly depends on countries' level of development and technology (Lewandowski et al. 2019). There was not, at the time of writing, any Egyptian alternative to use instead. The O*NET may better represent future rather than current skills in the Egyptian context. Future data collection by the Central Agency for Public Mobilization and Statistics (CAPMAS) will hopefully provide additional data on the skills workers have and employers require, to better assess this important topic in the Egyptian context. Egypt could also consider investing in its own version of the O*NET and updating it regularly to better understand the labour market and inform training and education systems.

While the LFS provides nationally representative data on current employment patterns and past trends, projecting future labour demand and especially future demand for skills is challenging. The employment projections in these analyses used 2017-2019 trends in skills, ability, and knowledge growth to project skills, abilities, and knowledge into 2022 and 2030. Doing so assumes that trends will continue unabated. While the past is the best source of projections available, in reality, structural shifts may occur. For example, Egypt's booming real estate and construction industry will not necessarily continue to grow rapidly forever; indeed, there could instead be a collapse in this industry. This projections approach is also based only on occupational change, not any shifts within occupations, since we do not know how those will unfold over time. Research from other contexts has emphasized that much of the change that happens in tasks and skills happens over time within occupations, rather than through job destruction or creation (Atalay et al. 2020). This point underscores the need for Egypt to develop its own version of the O*NET to track change within occupations.

5.3 Policy Recommendations

The **centrality of literacy and communication skills** has key implications for the education system. Although Egyptian young people attend 10 years of schooling, their learning-adjusted education is equivalent to only six years (El-Kogali and Krafft 2020). At grade three, 22% of Egyptian students still cannot read a single word (El-Kogali and Krafft 2020). **Investing heavily in early literacy skills** is critical both as a foundation to later learning and, given the importance of these skills, to later labour market outcomes. The importance of physical skills also underscores the need to continue to invest in the **health** and **fitness of students** and the **workforce.**

Soft skills, such as social perceptiveness and time management, as well as customer-service oriented skills, are important in the Egyptian labour market. Fostering these skills through the education system can help support **success in the labour market**. These skills are also, unlike specific technical or technological skills, relatively general and applicable to whatever the future of work may be. The results of the projections suggest that **future skills are not going to be radically different from current skills** in Egypt. Some skills, such as programming, are fast-growing, but from a low base (e.g., from a top skill for 0.1% of jobs to 0.6% over 2022 to 2030).

Providing literacy and communication, physical/health, and soft skills through the education system can also help overcome the difficulties policymakers, families, and students, face in understanding what specific skills are in demand in the labour market, due to weak signals of skill demand (Assaad, Krafft, and Salehi-Isfahani 2018). Business skills may also be a worthwhile investment, although primarily to prepare youth to work in existing businesses; youth should not be expected to become entrepreneurs given they have no work experience (Krafft and Rizk 2021).

There is **not strong evidence for skill-biased technological change in Egypt** in the employment projections. The shifts over time in skills are modest. There are not large shifts over time towards any particular groups of skills, abilities, or knowledge. Although there remains potential loss of middle-skilled positions as the structure of Egypt's economy evolves (Helmy 2015), the projections for 2022-2030 do not show strong skill polarization. As with other countries (Fox and Signé 2021), the ongoing series of industrial revolutions and structural changes are less likely to shape the future of work than the current structure and trajectory of the economy and demographic patterns.

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ANNEX 2 Crosswalk

Crosswalks from the O*NET data were undertaken separately for the 2017-2019 LFS data (ISCO-88) and 2020-2021 data (ISCO-08).

The crosswalk from O*NET 2019 to ISCO-88 used the following data sources:

1) The O*NET provides a crosswalk from O*NET 2019 to SOC-2010[11]
2) Hardy, Keister, and Lewandowski (2018) provide two cross-walks,[12] first from SOC-2010 to SOC-2000, second from SOC-2000 to ISCO-88.[13]

The crosswalk generated a many-to-many mapping, with multiple ISCO-88 codes sometimes corresponding to a single O*NET code and multiple O*NET codes sometimes corresponding to a single ISCO-88 code. The result was a set of 1,979 combinations of ISCO-88 and O*NET 2019 codes, representing 977 unique O*NET codes and 391 unique ISCO-88 codes.

The crosswalk from O*NET 2019 to ISCO-08 used the following data sources:

1) The O*NET provides a crosswalk from O*NET 2019 to SOC-2010 (same as used for ISCO-88)
2) Hardy, Keister, and Lewandowski (2018) provide a cross-walk,[14] from SOC-2010 to ISCO-08.[15]

The crosswalk generated a many-to-many mapping, with multiple ISCO-08 codes sometimes corresponding to a single O*NET code and multiple O*NET codes sometimes corresponding to a single ISCO-08 code. The result was a set of 1,839 combinations of ISCO-08 and O*NET 2019 codes, representing 1,012 unique O*NET codes and 436 unique ISCO-08 codes.

As with other researchers (Acemoglu and Autor 2011; Hardy, Keister, and Lewandowski 2016), the analyses focus on the importance rather than level of skills (the two are highly correlated (Hardy, Keister, and Lewandowski 2016)). Skills (N=35), Abilities (N=52) and Knowledge (N=33) were available for 873 O*NET occupations. As other research has done (Hardy, Keister, and Lewandowski 2016), the analyses take a simple average across O*NET occupations when multiple O*NET occupations map to an ISCO-88 or ISCO-08 occupation. When there are multiple ISCO-88 or ISCO-08 occupations that mapped to an O*NET occupation, the analyses employment-weighted the data by occupation from the 2017-2021 LFS. There are 354 of the 369 occupations present in the

[11] Available at https://www.onetcenter.org/taxonomy.html

[12] Available at https://ibs.org.pl/en/resources/occupation-classifications-crosswalks-from-onet-soc-to-isco/

[13] In cases (N=12) where there was an ISCO-88 code without a corresponding SOC-2010 code in Hardy, Keister, and Lewandowski (2018), the closest SOC-2010 code was identified on review and used. There was also one SOC-2010 code that was not in the cross-walk but was in the LFS and SOC-2010 codes, which was also recoded. Other SOC-2010 codes for which there were not good LFS/ISCO-88 categories were dropped.

[14] Available at https://ibs.org.pl/en/resources/occupation-classifications-crosswalks-from-onet-soc-to-isco/

[15] In cases (N=2) where there was an ISCO-08 code without a corresponding SOC-2010 code in Hardy, Keister, and Lewandowski (2018), the closest SOC-2010 code was identified on review and used. There was also one SOC-2010 code that was not in the crosswalk but was in the LFS and SOC-2010 codes, which was also recoded. Other SOC-2010 codes for which there were not good LFS/ISCO-08 categories were dropped.

2017-2019 (ISCO-88) LFS data with four-digit level O*NET data on skills, knowledge, and abilities. There are 383 of the 397 occupations present in the 2020-2021 (ISCO-08) LFS data with four-digit level O*NET data on skills, knowledge, and abilities. Higher levels of means (three, two, or one-digit, as needed) were used when four-digit data were not available.

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