WOMEN IN INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN GEORGIA

PARTICIPATION AND CHALLENGES

UN WOMEN

UN Women is the UN organization dedicated to gender equality and the empowerment of women. A global champion for women and girls, UN Women was established to accelerate progress in meeting their needs worldwide. UN Women supports UN Member States as they set global standards for achieving gender equality and work with governments and civil society to design laws, policies, programmes and services needed to implement these standards. It stands behind women's equal participation in all aspects of life, focusing on five priority areas: increasing women's leadership and participation; ending violence against women; engaging women in all aspects of peace and security processes; enhancing women's economic empowerment; and making gender equality central to national development planning and budgeting. UN Women also coordinates and promotes the UN system's work in advancing gender equality.

This publication was prepared by PricewaterhouseCoopers Georgia (PwC Georgia) in the framework of the Women's Economic Empowerment (WEE) component of Good Governance for Gender Equality in Georgia (GG4GEG), generously funded by the Government of Norway and commissioned by the UN Women Country Office in Georgia. The views expressed in this publication are those of the author(s) and do not necessarily represent the views of UN Women, the United Nations or any of its affiliated organizations or that of the Norwegian Ministry of Foreign Affairs.

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UN WOMEN

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ACRONYMS AND ABBREVIATIONS

EU	European Union
FGD	Focus Group Discussion
GB	Gigabyte
GCCI	Georgian Chamber of Commerce and Industry
GDP	Gross Domestic Product
GEL	Georgian Lari
Geostat	National Statistics Office of Georgia
GITA	Georgia's Innovation and Technology Agency
GNI	Gross National Income
GPA	Grade Point Average
ICT	Information and Communications Technology
IDI	In-depth Interview
IT	Information Technology
ITU	International Telecommunication Union
Mbps	Megabits per second
NACE	Statistical Classification of Economic Activities in the European Community
OECD	Organisation for Economic Co-operation and Development
PhD	Doctor of Philosophy
PwC	PricewaterhouseCoopers
STEM	Science, Technology, Engineering and Mathematics
UN Women	United Nations Entity for Gender Equality and the Empowerment of Women
VET	Vocational Education and Training

1

PROJECT BACKGROUND

1.1 BACKGROUND AND RATIONALE OF THE PROJECT

In recent years, Georgia has made prominent advancements in the areas of gender equality and non-discrimination. Especially noteworthy is its progress in the direction of legislative and policy decisions. In March 2021, the Government of Georgia joined the Generation Equality Forum and undertook new commitments in the area of Technology and Innovation for Gender Equality:

1. Mainstream gender in legislation with the potential to affect women and gender equality, including through technology and innovation, and integrate the GIA (Gender Impact Assessment) methodology.
2. Invest in reaching out to women start-uppers and supporting them in applying to blended finance instruments to implement promising projects that build tech competencies, skills and pathways (including reskilling and upskilling). This will equip women and girls equitably for the transition from learning to earning independently.
3. Develop and implement a specialized programme for advancing women's engagement in the innovation and technology sector through public-private partnerships (including through skill set building, internships and employment support).
4. Expand innovative, gender-equitable (transformational) distance learning and blended learning modalities to reach all people and localities without easy access to the Internet or digital devices.
5. Provide safe, gender-responsive and well-equipped learning environments for girls and women to access and build digital technologies, develop competencies and learn twenty-first-century skills.
6. Conduct a campaign on attracting more girls and women to STEM and ICT fields.
7. Invest in targeted support for women innovators and entrepreneurs to help them develop and scale their activities.
8. Provide girls and women with access to role models and mentors to smash stereotypes and promote a culture of innovation.
9. Create new data sets to monitor the representation of women and girls in technology and innovation and develop relevant indicators and measures to track progress.

However, despite the efforts of the Government of Georgia, various international development partners (including UN Women), civil society and private organizations, there is still a gap between female and male economic participation. This gap involves various aspects, from entry into various education levels to the transition from education to work, including wage disparities. Although the statistics show that generally there is no gap between the participation of males and females in different levels of education (51 per cent female versus 49 per cent male students pursuing a bachelor's degree in 2021/22), the information and communications technology (ICT) sector remains male dominated, with 86 per cent of students in bachelor's programmes being male in the 2021/22 academic year. In terms of economic participation, female employees in Georgia are also underrepresented in the ICT sector. The significant wage gap between the genders, including in the ICT sector, is a major issue in the country, with female

employees earning 20 per cent less than male employees in 2020. The above-mentioned trends might cause a significant challenge for the country in the future considering the importance of further socioeconomic development.

According to various studies (including by McKinsey or BCG), megatrends like technology changes and globalization are the top factors affecting education, skills and employment opportunities of the future. Especially since the start of the COVID-19 pandemic, the development of the ICT sector has become crucial for countries to achieve continued economic and social activity. The pandemic has accelerated digital transformation as businesses started to switch to more flexible models of employment and deliver their products and services digitally. In addition, educational institutions have been forced to move to online learning, and governmental institutions have discovered the need to gather significant amounts of data on citizens, including health and economic indicators, to establish policies for mitigating the impact of the pandemic.[1]

Overall, the pandemic has increased the digitalization process and has spurred the need to engage more individuals in the ICT sector. However, according to the World Bank analytical framework (2021),[2] the COVID-19 pandemic might have a differential impact on men and women, which can widen the existing gender gaps and affect long-term growth and development. For example, since women were more likely than men to stay at home and take on additional family responsibilities, such as taking care of children and homeschooling, their employment status and income-generating opportunities might be negatively affected in the future. Thus, in order to facilitate the engagement of more individuals—especially more women—in the ICT sector, it is important to identify the existing barriers caused by the above-mentioned trends and developments.

According to existing reports and publications, major obstacles and barriers in Georgia that disable the increased participation of women in ICT include the following:

- Stereotypes around technical professions
- The obligation of women to spend considerable time on household and care responsibilities
- Unequal access to funding

Enabling women's participation in ICT educational programmes (including Science, Technology, Engineering and Mathematics (STEM)) and increasing their access to ICT jobs and infrastructure can play a vital role in women's economic empowerment and subsequently in increasing the pace of the country's economic development and well-being.

The above-mentioned factors and stereotypes, as well as the local and global trends, indicate that there is a need for more thorough research in this direction. Subsequently in this context UN Women Georgia decided to conduct a baseline research study on the participation of women and girls in the ICT sector in Georgia, analysing the findings and developing relevant recommendations.

1.2 PROJECT GOALS AND OBJECTIVES

Study "Women in Information and Communication Technology (ICT) in Georgia – Participation and Challenges" was prepared by PricewaterhouseCoopers Georgia (PwC Georgia) in the framework of the Women's Economic Empowerment (WEE) component of Good Governance for Gender Equality in Georgia (GG4GEG), generously funded by the Government of Norway and commissioned by the UN Women Country Office in Georgia.

In particular, the **overall goal** of the study was to collect baseline data on the participation of women and girls in the ICT[3] sector in Georgia, identify the issues and analyse the root causes of the gender divide in the ICT industry in Georgia, and provide potential solutions for the way forward.

Specific objectives of the study were as follows:

1. To provide an overview of the sector through a gender-lens analysis of the access, employment and education trends in the ICT sector in Georgia
2. To identify and analyse the root causes of the gender divide in education and employment in ICT in Georgia
3. To provide action-oriented recommendations for key actors

2 APPROACH AND METHODOLOGY

2.1 STUDY APPROACH

The approach and methodology were designed to fulfil the core objectives of the study on women's participation in technology in Georgia. A multidimensional gender-responsive approach highlighting an equity-driven focus, covering key UN Women mandates, was adopted for the study.

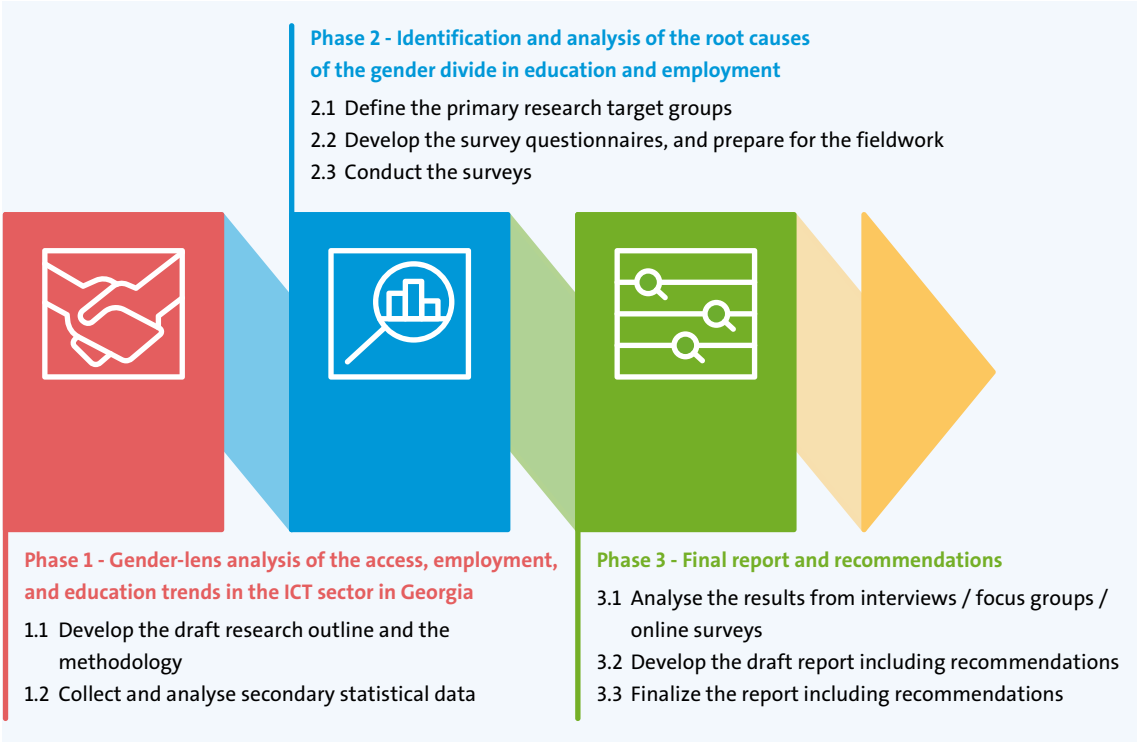
The overall approach to the study was consultative, participatory and inclusive. A mixed-methods approach for data collection from both primary and secondary sources was instituted for this purpose. A thorough secondary document review was conducted covering a variety of reports on global ICT trends, access to infrastructure both globally and in Georgia, the state of the education system in Georgia, country statistics and Georgia's standing in various global indices in relation to key study parameters. This was augmented using a participatory process through which the findings from the secondary review were validated and further triangulated with primary interactions conducted with stakeholders, including the UN Women Country Office, representatives of educational institutions, students, company representatives from the ICT sector, government agency representatives and select experts.

Described in Figure 2.1 below, a three-phased approach was adopted for the study implementation:

1. Gender-lens analysis of the access, employment and education trends in the ICT sector in Georgia
2. Identification and analysis of the root causes of the gender divide in education and employment
3. Development of the final report, including recommendations

FIGURE 2.1

Three-phased approach to study implementation



2.2 STUDY METHODOLOGY

This report is a consolidation of the work undertaken by PwC to meet the project objectives. A mixed-methods research approach was used for designing the study that combines quantitative and qualitative data-collection techniques and analysis, specifically covering:

- Secondary research – a review of existing reports and data sources
- Primary research:
  - Quantitative study – an online survey
  - Qualitative study – in-depth interviews and focus groups

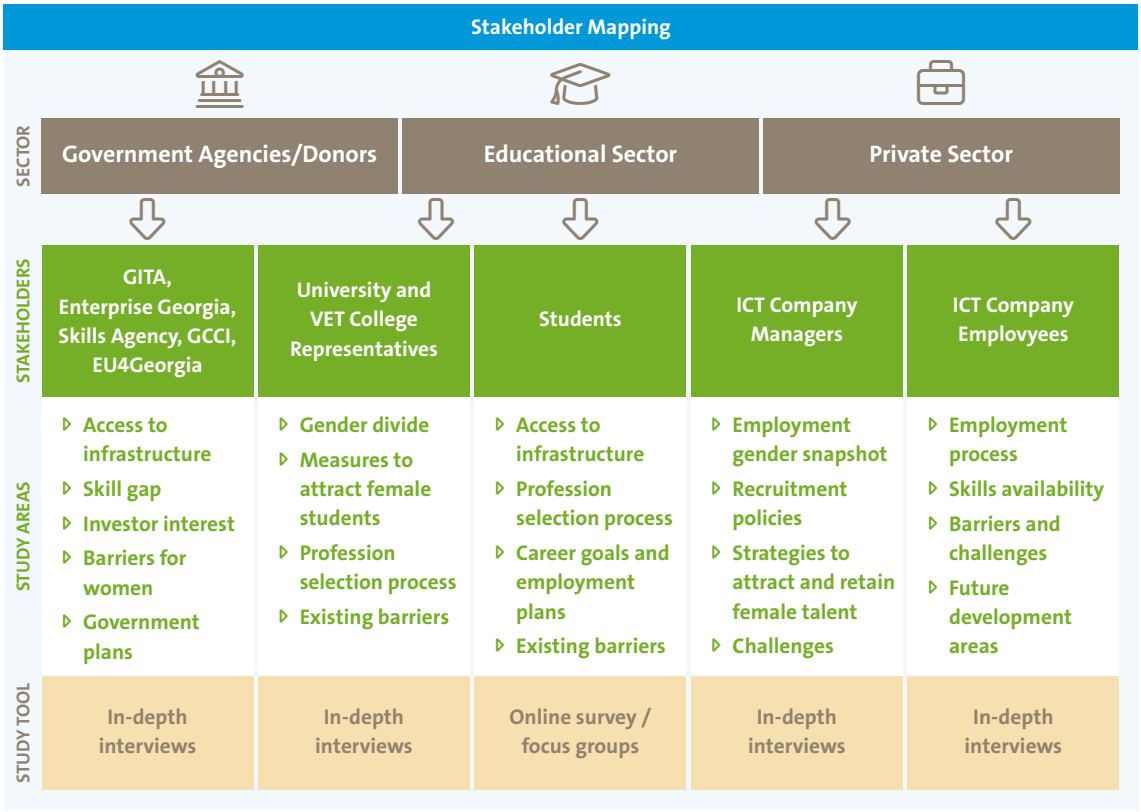
2.2.1 Key stakeholder mapping and sampling

Two groups of stakeholders were considered for the study: internal and external. The UN Women Country Office as a key internal stakeholder was closely involved in the design, management and implementation of the study.

The external stakeholders were categorized into the following main groups: (1) government and donor agencies; (2) the educational sector; and (3) the private sector. These stakeholders were consulted to gain an understanding of the ICT sector in Georgia, the state of the educational system and the availability of the key infrastructure within the country, in accordance with the Terms of Reference for the evaluation. Figure 2.2 presents a summary of the stakeholders identified for the primary research process and key discussion areas within each target group. In total, 20 key in-depth interviews and six focus groups were conducted, and 360 students participated in the online survey.

FIGURE 2.2

Key stakeholders and discussion topics



The list of the above-mentioned stakeholders was consolidated after discussions and consultations with UN Women during the inception and implementation phases, with reference to the inputs that the suggested stakeholders would be able to provide as per the study questions.

2.2.2 Secondary research

The project team undertook a mapping exercise of the existing literature to define the available data, the existing information gaps and the need for further research and consultations with various stakeholder groups in line with the study objectives. The mapping was done against the research areas to ensure that suggested data sources enable formulation of the key research questions. After completing the mapping activity, the team reviewed the existing local and international reports (see the References list of this document). The team analysed these data with the prism of segregating them by gender and place of residence, as well as relevant characteristics such as access to various education sectors and sectoral employment. After the secondary research component was finalized, the team developed the main research questions to be further investigated and tested through online surveys, in-depth interviews and focus groups. The online survey questionnaire is presented in the Annex A of this document.

2.2.3 Primary research

2.2.3.1 Quantitative study: Online survey

The main objective of the online survey was to understand the various barriers that ICT students (both males and females) from selected higher and vocational education and training (VET) institutions face in the ICT sector, more specifically:

- Students' access to ICT infrastructure
- Their level of proficiency in the English language and in computer skills by the end of their school education and as of now
- Barriers and challenges prior to choosing their education field and while pursuing their studies
- Their career plans

Sampling approach for quantitative data collection

As a first step, the project team obtained the long list of universities and VET colleges (i.e. the online survey's target groups) available on the website of the Ministry of Education and Science of Georgia. Information regarding the types of programmes offered by all educational institutions on the long list was researched. Using a purposive sampling approach, the long list was further shortlisted by the availability of ICT programmes, and the target list for the online survey was developed see Annex B of this document). Once the final agreement was reached with UN Women on the list of targeted educational institutions for the online survey, the list of specific ICT programmes in each educational institution was obtained. The educational institutions were requested to share the online survey questionnaire with students in the selected ICT programmes. The final list of universities selected across Georgia encompasses both rural and urban (Tbilisi and other cities) areas to highlight and represent a diverse social milieu.

Based on the secondary research findings, the PwC project team created the web-based survey questionnaire, which was converted into an online survey platform and tested prior to sharing it with students of the selected target groups. The survey was conducted during the period between July and September, and a total of 360 responses were obtained.

Quantitative data analysis

Data collected through the web-based questionnaire were cleaned and validated through the in-depth interviews and focus groups. Data were analysed to identify the trends and patterns of responses to complement the study findings. A cross-tabulation analysis was conducted to draw inferences between the collected data in terms of respondents' gender and place of residence. The profile of the online survey participants and key insights of the survey results are presented in section 3.2 (Primary research) of the report.

2.2.3.2 Qualitative study: In-depth interviews and focus groups

In addition to the online survey of the students, qualitative data collection included conducting 20 in-depth interviews (IDI) and discussions with key stakeholders as well as six focus group discussions (FGD) with school students (40 participants in total) and university students (20 participants in total) in Tbilisi and the regions of Georgia. Interview guidelines were prepared for each individual target group on IDI and FGD and approved by UN Women. The study framework was used to collate and consolidate the

insights for each IDI and FGD, which further strengthened the evidential literature review conducted in the previous step. The outcomes from these exercises were collated, and the information was arranged against the different phases, themes and research areas. Following this, study parameters were analysed to validate the assessments of the key study research areas. The main findings from IDIs and FGDs are presented in section 3.2 (Primary research) of the report, complementing the findings of the online survey and providing more in-depth insight into the trends identified in the student responses.

2.2.4 Timeline

The study was conducted in the period of May–October 2022.

2.2.5 Ethical considerations

This is a baseline study commissioned by UN Women Georgia. All views captured from various stakeholders are objective and clear of any biases and have been inclusive of the key ethical considerations.

PwC ensured that the study was conducted with the standards of integrity and respect for the beliefs, manners and customs of the social and cultural environment; for human rights and gender equality; and for the 'do no harm' principle in light of the utilization of virtual platforms for research. The PwC project team respected the rights of institutions and individuals to provide information in confidence. Accordingly, the team ensured that sensitive data are protected and cannot be traced to their source. All information was obtained with informed consent for the use of private information from those who provided it.

Ethical considerations were applied at the following two stages:

1. Prior to initiation of the study:
   - **Including a gender and local perspective** – Ethics is not just about the procedure but about being mindful of possible ethical issues within the local context, taking a step back, discussing, creating mitigation strategies and adjusting plans before heading into data collection. In this regard, the project team considered the perspective of the national and gender context in order to frame a holistic and ethical study design.

2. During data collection and reporting:
   - **Securing personal and sensitive information** – The project team managed personal data with the utmost confidentiality and solely used it for the purpose of the study. No phone numbers were collected.
   - **Omitting personal information** – None of the respondents' personal information was collected during the roll-out of the online survey. This prevented access to the respondents' personal information and also provided anonymity to the responses.
   - **Conducting face-to-face interviews and focus groups** – Considering the ongoing COVID-19 pandemic, all respondents were asked if they would like to be interviewed virtually or face to face. Based on the individual preferences of the respondents, a mixed approach was used, with the majority of meetings being conducted face to face.

- **Accounting for biases and limitations** – The project team was sensitive to the fact that surveys can be prone to biases due to restricted sampling frames or low response rates. Since accurately presenting findings is core to the integrity of evidence generation, the acknowledgement of any possible bias and potential lack of representativeness of the data and all potential limitations/caveats was made, and insight into the survey limitations is provided in the next subsection of the report.
- **Making select recordings** – No recordings were made during the course of the project.
- **Protecting data** – The project team treated data systems as valuable organizational assets; thus, data backup was a mandatory affair. Further, the team safeguarded sensitive data to guarantee privacy and confidentiality; for example, the team's servers were accessible to limited project team members only.
- **Maintaining independence** – The project team respected the independent nature of the research and refrained from influencing or applying undue pressure on those participating in it.
- **Ensuring impartiality** – The project team shared no personal relationship with any stakeholder (internally and externally), ensuring unbiased behaviour. Further, the use of data for the project was impartial and respected, and it protected and promoted human rights as per appropriate international standards. The project did not discriminate on the basis of gender, race, religion or any other factor.
- **Upholding accountability** – The project was conducted in a rigorous, fair and balanced way, and any judgments made were based on sound and complete evidence that can be verified.

2.2.6 Study limitations and disclaimers

Some of the limitations of the study include the following:

- The online survey was conducted during the examination and summer holiday period for students at universities and VET colleges, which affected the response rate. The team used IDIs and FGDs to validate the trends identified in the online survey results. Thus, the results of the survey demonstrate the key barriers highlighted by those students who participated in the survey.
- A limited number of master's and PhD students participated in the online survey; thus, most of the findings are based on the analysis of bachelor's and VET programme students' responses.
- In-depth interviews were conducted with a limited number of selected respondents, and their comments cannot be considered representative of all universities, VET colleges and ICT companies. These interviews were used to substantiate or strengthen the quantitative data analysis and to share anecdotes, wherever relevant.
- The project team used the publicly available data, as well as approached the National Statistics Office of Georgia (Geostat), Skills Agency Georgia, and the Ministry of Education and Science for additional data. However, there are still some limitations regarding the existence of the data available for secondary research. As part of the project scope, in the recommendations portion of the report (Chapter 5), the team has developed a list of suggested statistical data that should be collected to enable a more gender-focused analysis of the ICT sector.

This report summarizes the key findings, analysis and recommendations drawn from the secondary research, online survey, IDIs and FGDs.

2 ANALYSIS OF BARRIERS FOR WOMEN IN THE ICT SECTOR

3.1 SECONDARY RESEARCH

The secondary research was conducted with reference to a list of published literature, country-level statistics and documentation of similar projects analysed and compiled under the key study parameters. The secondary research is structured as follows: first, a quick overview of the global ICT market and trends is provided, then the topic of access to infrastructure is covered, followed by an analysis of the trends in ICT education. This section primarily focuses on the secondary data; however, insights from the primary research have been used in select places to support the secondary data analysis.

3.1.1 Overview of global ICT market and trends

The global ICT market is growing.

According to the Organisation for Economic Co-operation and Development (OECD), the ICT sector is a combination of manufacturing and services industries that capture, transmit and display data and information electronically.[1] According to the market estimate of the International Data Corporation (IDC), the global ICT market was valued at around USD 5.2 trillion, with the United States accounting for 32 per cent of the market. The market continues to see stable growth as economies, businesses, employment and personal lives continue to become more digital and automated.[2]

The COVID-19 pandemic had considerable impact on digitalization, impacting the demand for ICT services.

COVID-19 forced the public and private sectors to expedite their ICT agenda to keep pace with the global digitalization. The pandemic created the accelerated need for improved broadband connectivity, the adoption of online business models, the emphasis on supply chain connectivity, the promotion of online payments and the enhancement of digital skills.[3] According to the International Telecommunication Union (ITU), countries with top connectivity infrastructure could mitigate up to half of the negative economic impact of the COVID-19 pandemic.[4]

The increased need for digitalization has stressed the need to address the following challenges in a timely manner:

- The uneven pace of the acceleration of digitalization created by the COVID-19 crisis can increase inequalities and the digital divide between territories, urban and rural areas, and population age groups, as well as exacerbate the unequal access for men and women.
- There is uneven access to technology when comparing multinational and large companies to small and medium-sized enterprises, particularly in developing countries.
- Cybersecurity has become a top priority with the increased need to keep business and personal information secure.
- There is additional pressure on the existing infrastructure and a need for investment to upgrade and modernize the digital infrastructure.

- The availability of ICT specialists has fallen behind the growing demand generated by the public and private sectors and has resulted in a shortage of skills, both in the number of specialists and in up-to-date knowledge.[5]

The gap in the availability of qualified ICT specialists continues to grow.

Full-time employment in the ICT sector worldwide is expected to reach 62 million in 2023, a 17 per cent rise since 2019.[6] Furthermore, according to Eurostat, the number of ICT specialists in the European Union (EU) grew by 50 per cent from 2012 to 2021, eight times as high as the increase for total employment. Currently, an average 4.5 per cent of the whole workforce in the EU is employed in the ICT sector, with Sweden leading with an 8 per cent share of the total employment (188,000 ICT specialists as of 2021). At the same time, Eurostat also reports that men represent 81 per cent of ICT specialists in the EU, while only 19 per cent are women.[7]

The increasing digitalization of work has created a growing demand for high-skilled workers with advanced digital skills, apparent across all economic sectors. STEM education and the ICT sector have increased in importance in the overall economy and secured their status as providing well-paid, high-quality jobs. However, the supply of ICT specialists is not growing in line with the employment requirements. According to the 2018 estimate of the European Commission, the EU faces a shortage of 600,000 ICT specialists, and this gap only increased with the demand created by the pandemic.[8]

Human capital in ICT is a driving force for digital and digital-enabled innovations and is considered crucial for the competitiveness of modern-day economies. With the ICT sector heavily gender segregated and facing a huge demand for new specialists,[9] the greater involvement of women is crucial for the support of the digitalization process and growth of economies. Thus, this report focuses on exploring the main barriers faced by women in the ICT sector in Georgia and provides recommendations of ways to reduce such barriers and, as a result, increase women's participation in the ICT sector.

3.1.2 Access to ICT infrastructure in Georgia

One of the primary preconditions for achieving digital transformation is focusing on broadband[10] development. It is one of the key enablers for businesses, consumers and citizens. Access to a robust ICT infrastructure (i.e. fixed, mobile, wireless, satellite) creates a pathway towards sustainable development by enabling innovative services and economic activity to take place. After the outbreak of the COVID-19 pandemic, countries with poor connectivity faced a greater disruption than those with more connectivity. At the same time, the pandemic has also exposed digital divides by exacerbating existing social and gender inequities and highlighting the damaging implications of being excluded from the digital world. This further indicates the importance of creating reliable infrastructure and services that everyone can have access to.[11]

Georgia ranks higher on various digital infrastructure rankings and indices when compared to global averages and, in certain cases, to similar income group countries (Table 3.1). However, considerable work still needs to be undertaken to improve the digital infrastructure in line with the achievements of Europe and countries in the region (Table 3.2).

TABLE 3.1

Digital infrastructure indices on mobile connectivity and ICT adoption

Name of the index	Georgia	Regional average	Income group average	World average	Description of the index
Mobile Connectivity Index: Overall Index (*Source:* GSMA 2019)	60.64	75.18	61.28	58.39	The Overall Index score is a composite indicator based on four equally weighted enablers of mobile connectivity: affordability, consumer readiness, content and services, and infrastructure.
Mobile Connectivity Index: Indicator score – Cost of entry usage basket (100 MB) (*Source:* GSMA 2019)	50.53	66	47.7	47.47	Based on the monthly cost of a 100 MB pre-paid mobile broadband data plan (originally expressed as a proportion of GDP per capita). This indicator is in the Mobile Tariffs Dimension.
Global Competitiveness Index 4.0, Pillar 3: ICT adoption (*Source:* WEF 2019)	63.73	69.29	57.04	54.89	ICT adoption is Pillar 3 of the Global Competitiveness Index 4.0. It is the mean of the scores of its components: mobile cellular telephone subscriptions, mobile broadband subscriptions, fixed broadband Internet subscriptions, fibre Internet subscriptions, and Internet users. All GCI scores are normalized using a min-max approach to a unit-less progress score ranging from 0 to 100, where 100 is the ideal value.
Global Competitiveness Index 4.0: Internet users (*Source:* WEF 2019)	63.97	80.79	66.48	60.1	A component indicator used in Pillar 3 (ICT adoption) of the Global Competitive Index 4.0. Percentage of individuals using the Internet.

Note: Assigned scores range from 0 to 100, with a higher score assigned to better performers.

TABLE 3.2

Digital infrastructure indices on ICT availability and usage

Name of the index	Georgia	Europe	World	Description of the index
E-Government Development Index (EGDI): Telecommunication Infrastructure Index (*Source:* UN DESA 2016)	0.69	0.82	0.55	The Telecommunication Infrastructure Index (TII) is an arithmetic average composite of five indicators: (i) estimated Internet users per 100 inhabitants; (ii) number of main fixed telephone lines per 100 inhabitants; (iii) number of mobile subscribers per 100 inhabitants; (iv) number of wireless broadband subscriptions per 100 inhabitants; and (v) number of fixed broadband subscriptions per 100 inhabitants.
The Network Readiness Index, Pillar 1: Technology (*Source:* Portulans Institute 2021)	40.84	59.78	–	The Network Readiness Index (NRI) is a key indicator of how countries are progressing in the digital world. The NRI has provided, for the first time, a holistic framework for assessing the multifaceted impact of ICT on society and the development of nations. The Technology pillar therefore seeks to assess the level of technology that is a sine qua non for a country's participation in the global economy.
The Network Readiness Index, Pillar 2: People (*Source:* Portulans Institute 2021)	48.32	60.83	–	The NRI's People pillar is concerned with the application of ICT by people at three levels of analysis: individuals (how individuals use technology and how they leverage their skills to participate in the network economy); businesses (how businesses use ICT and participate in the network economy) and governments (how governments use and invest in ICT for the benefit of the general population).

Note: Assigned scores range from 0 to 100, with a higher score assigned to better performers.

Overall, access to the digital infrastructure, especially in terms of mobile Internet connectivity, is good in Georgia compared to the world and similar income level countries, with considerable differences among the urban and rural population and problems remaining in fixed broadband connectivity and in Internet quality.

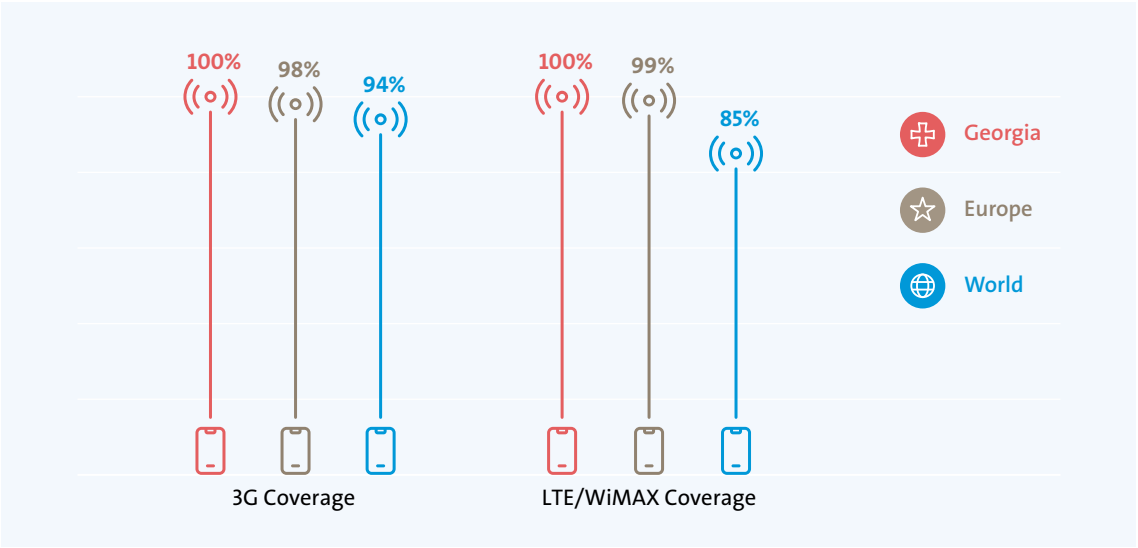
To understand the quality of access to the digital infrastructure in Georgia, information about accessibility in the country was obtained, and where data are available, the level of accessibility is compared to that of Europe and the world. First, population coverage by Internet type is discussed. Then, more insight is

provided regarding the number of subscriptions per 100 inhabitants for telephone and mobile cellular services, as well as active mobile and fixed broadband. Lastly, more details are provided regarding Internet and computer use in Georgia.

Internet coverage – As seen in Figure 3.1, Georgia has higher mobile Internet coverage (100 per cent for 3G coverage and LTE/WiMAX coverage) than both Europe (98 per cent 3G and 99 per cent LTE/WiMAX) and the world (94 per cent 3G and 85 per cent LTE/WiMAX).[12]

FIGURE 3.1

Population coverage, by mobile network technology and location, 2020

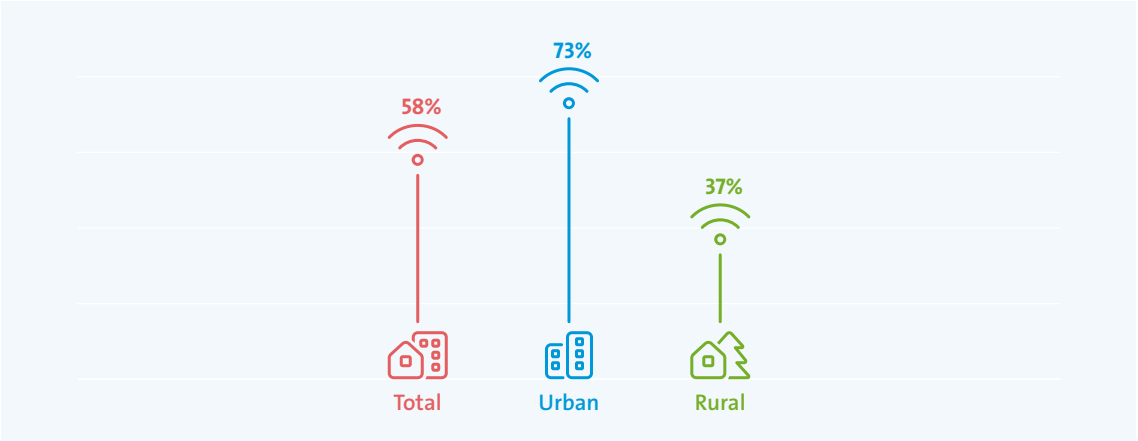


Source: ITU 2017–2020.

Household fixed broadband Internet access is lower compared to mobile broadband access, especially in rural areas of Georgia (Figure 3.2). The difference between urban and rural areas is mainly driven by service availability and cost.

FIGURE 3.2

Proportion of households with access to the Internet via fixed broadband and mobile broadband network, by place of residence, 2020

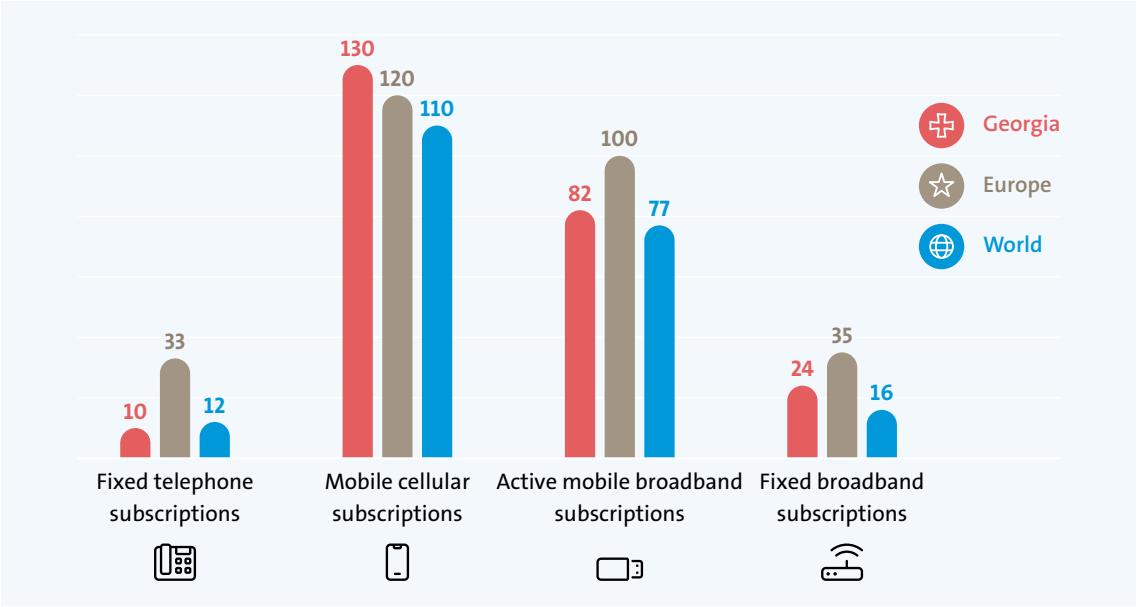


Source: ITU 2017–2020.

Subscription rate – As seen in Figure 3.3, mobile cellular subscriptions[13] per 100 inhabitants in 2020 were higher in Georgia (130) than in both the European region (120) and the world (110). According to Figure 3.3, fixed telephone subscriptions[14] have been decreasing over the years and are currently lower in Georgia than they are in Europe and the world.[15] The decrease in fixed telephone subscriptions is balanced by the increase in mobile cellular subscriptions, which is generally driven by the accessibility and lower cost of mobile technologies over fixed technologies. However, while the number of fixed telephone subscriptions is relatively lower in Georgia than in the world, the number of fixed broadband subscriptions[16] is still higher (24) than the world average (16) and slightly lower than the European average (35). Similar to the fixed broadband subscriptions, there are slightly fewer active mobile broadband subscriptions[17] (82) in Georgia than in Europe (100) but relatively more subscriptions than in the world (77).[18] Overall, these data indicate that compared to other European countries, mobile phones in Georgia are used more for voice communication than for Internet access. Nevertheless, this trend has been increasing over the years, with more citizens subscribing to active mobile broadband in the period of 2016–2020 (Figure 3.4).

FIGURE 3.3

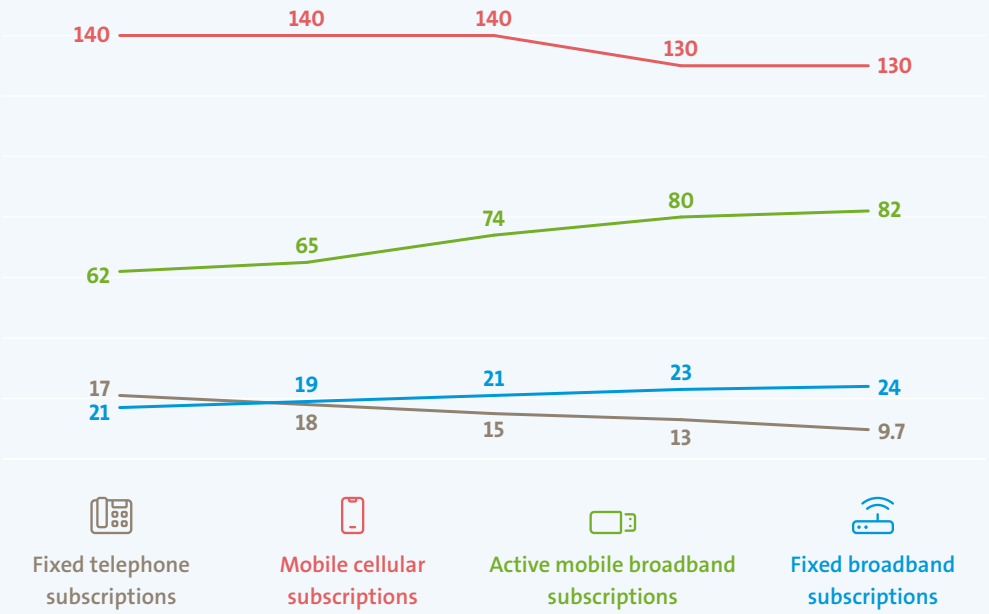
Fixed telephone and mobile cellular subscriptions per 100 inhabitants, by location, 2020



Source: ITU 2017–2020.

FIGURE 3.4

Fixed telephone and mobile cellular subscriptions per 100 inhabitants in Georgia, 2016–2020



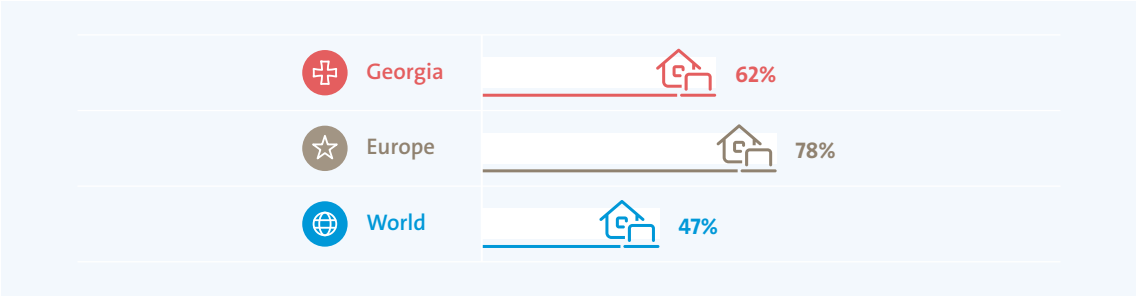
Source: ITU 2017–2020.

Computer access – Differences in income levels in Georgia and Europe, expressed by GDP per capita, are one of the key factors affecting the share of households with computer access in Georgia compared to European countries (62 per cent versus 78 per cent, respectively; see Figure 3.5).[19] Despite high indicators of Internet and computer access, IDI respondents emphasized that simply providing access is not sufficient and that educating the population on the proper use of digital tools, especially the younger generation, should be prioritized. This issue is more significant in the regions than in Tbilisi. Limited English language skills, which are essential for learning how to use digital tools, further hampers the education process.

> "Access to the Internet is not an issue; many have access but do not use it properly. Similarly, there are computers in every school; however, students have very limited computer skills."
>
> —Government organization

FIGURE 3.5

Households with computer access, by location, 2020



Source: ITU 2017–2020.

Despite the good Internet coverage, Internet quality remains a challenge.

Quality of Internet connection – While Internet access in Georgia is high, issues remain related to the poor quality of the Internet connection, which became more evident during the COVID-19 pandemic. According to the 2020 annual report of the Communications Ombudsman in Georgia, users submitted 822 complaints in 2020, 297 (36 per cent) of which concerned low-quality connections.[20] In addition, speed testing performed by the company Ookla in July 2022 demonstrated that the average download speed for a fixed Internet connection was 27.41 Mbps, ranking Georgia 135th in the Speedtest Global Index. On the other hand, the average download speed for a mobile Internet connection was 43.25 Mbps, ranking Georgia 73rd on the Speedtest Global Index.[21]

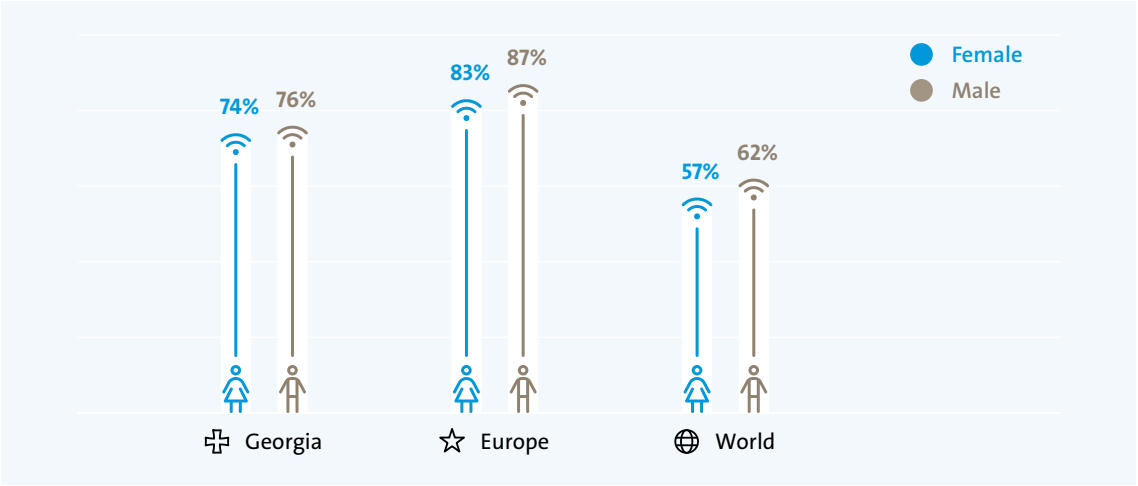
The share of the Internet users in Georgia is above the world average but still lower than European indicators.

Internet use – Similarly, as demonstrated in Figure 3.6, Georgia has a lower share of Internet users than other European countries (73 per cent and 85 per cent, respectively). On the other hand, when comparing both indicators to the world, Georgia is notably above average.[22]

According to Figure 3.6, there is a similar trend in all territories, with slightly fewer reported female Internet users than male users. However, while the general Internet usage is lower in Georgia than in Europe, the gender gap in Georgia is smaller (2 per cent) than in both Europe (4 per cent) and the world (5 per cent).[23]

FIGURE 3.6

Share of population using the Internet, by gender and location, 2020



Source: ITU 2017–2020.

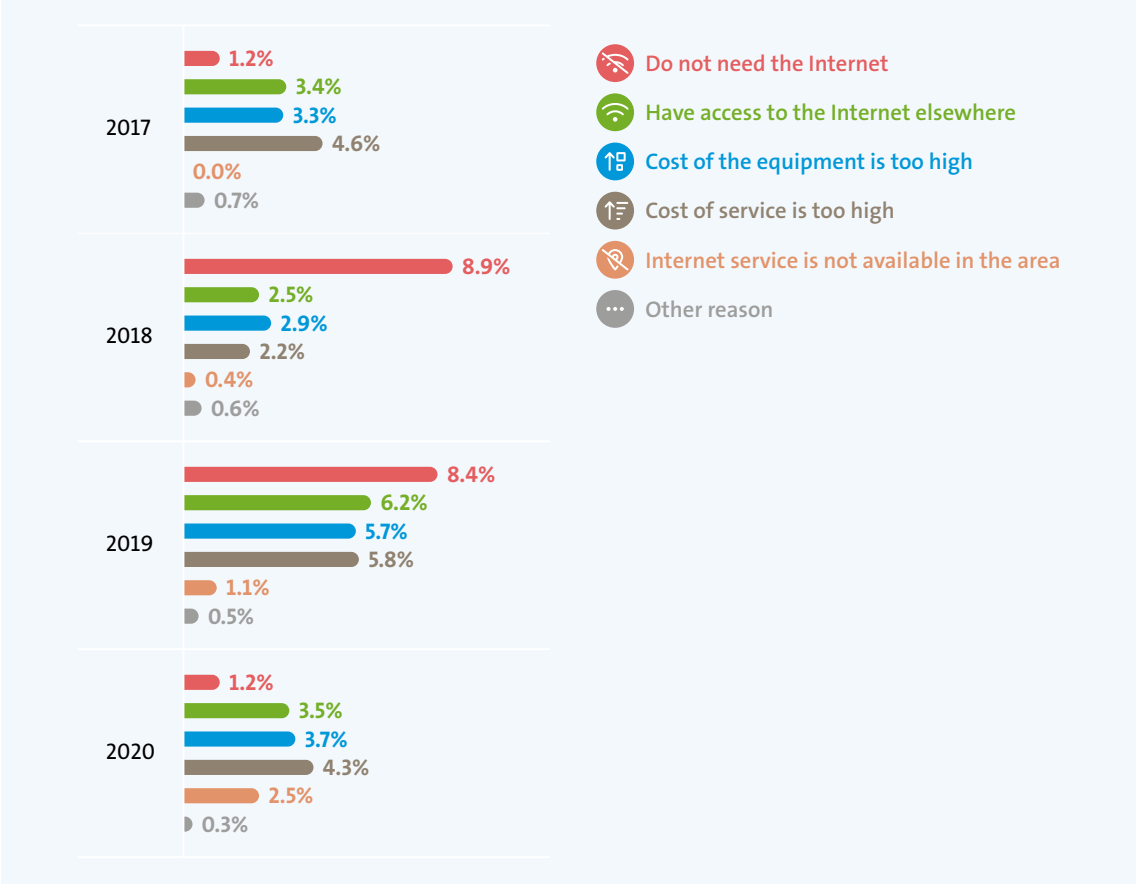
Internet prices are slightly higher than in Europe, affecting the share of the population without Internet access.

Broadband prices – The fixed broadband connection trend has been increasing slightly over the years.[24] Nevertheless, the lower number of fixed broadband subscriptions in Georgia versus the European region can be attributed to the relatively high cost of the fixed broadband basket (2.79 per cent of GNI per capita), which is far above the European region's average of 1.2 per cent of GNI per capita and is also close to the world average figures (2.77 per cent of GNI per capita). In contrast to the fixed broadband costs, the data-only mobile broadband basket was 0.6 per cent of GNI per capita for a monthly allowance of 1.5 GB.[25] This number indicates that Georgia has achieved the Broadband Commission's 2 per cent target for the cost of the mobile data basket and is also in line with the European region's average of 0.6 per cent of GNI per capita. This number is significantly lower than the world's average (1.23 per cent of GNI per capita). Georgia was also one of the few countries that offered the minimum of 1.5 GB for a price less than 1 per cent of GNI per capita.[26]

In addition, Figure 3.7 below presents the main reasons for not having Internet access at home in Georgia, as identified by ITU. It seems that in the years 2018 and 2019, the majority of those individuals who did not have Internet access at home felt that it was not necessary (8.9 per cent in 2018 and 8.4 per cent in 2019). As a result of the COVID-19 pandemic, this perception has changed; starting from 2020, this proportion dropped to 1.2 per cent. Another reason for these individuals not having Internet access at home is their use of other locations for Internet access, which can be attributed to the high costs of the equipment and services at home. The highest proportion of individuals who have identified cost as the main reason for not having Internet access at home was nearly 6 per cent in 2019. In 2020, this proportion dropped to around 4 per cent. Nevertheless, out of all the reasons identified in 2020, high costs still hold the largest share. Lastly, in 2020, the proportion of individuals who identified the unavailability of Internet services as the reason increased (2.5 per cent) compared to the previous year (1.1 per cent).[27] However, as previously mentioned, since Georgia has about 100 per cent Internet coverage, it might be attributed to the poor quality of the Internet rather than to the actual availability of Internet services.

FIGURE 3.7

Key reasons for not having Internet access at home, 2017–2020



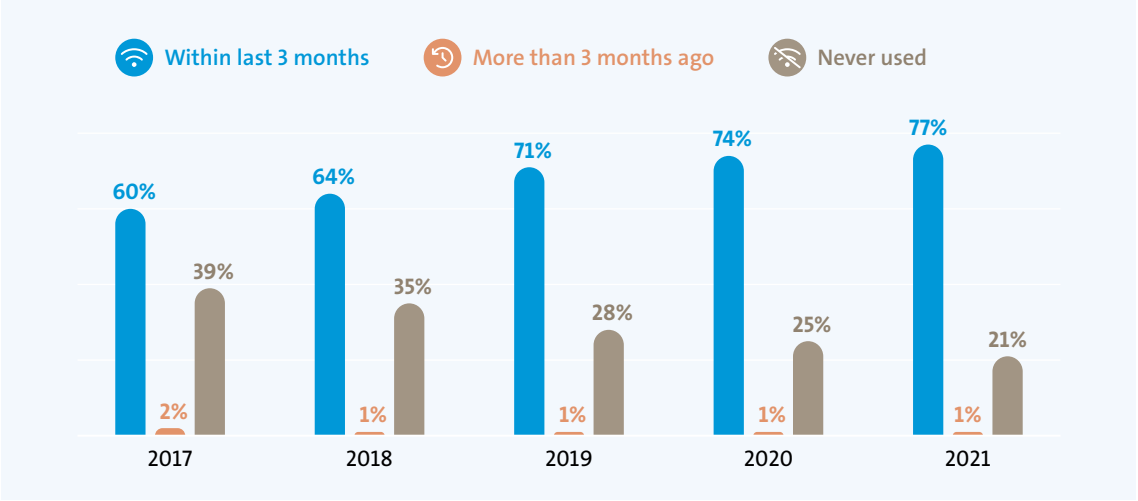
Source: ITU 2017–2020.

The share of the population who regularly uses the Internet in Georgia is growing at a fast pace.

According to Figure 3.8, the share of the population who had used the Internet within the preceding three months has increased significantly (by 17 per cent) from 2017 to 2021, as opposed to only a small increase in computer usage.[28] Considering the fact that during the pandemic, the majority of students and employees were forced to switch to online learning and working environments, the possible explanation for these data could be that many individuals started to use different technologies to access the Internet such as smartphones, tablets and similar devices. On the other hand, similar to computer usage, the proportion of individuals who have never used the Internet has significantly decreased (by 18 per cent) from 2017 to 2021.[29] However, 21 per cent of the population has still never used the Internet, even once.

FIGURE 3.8

Share of population in Georgia that uses the Internet, 2017–2021

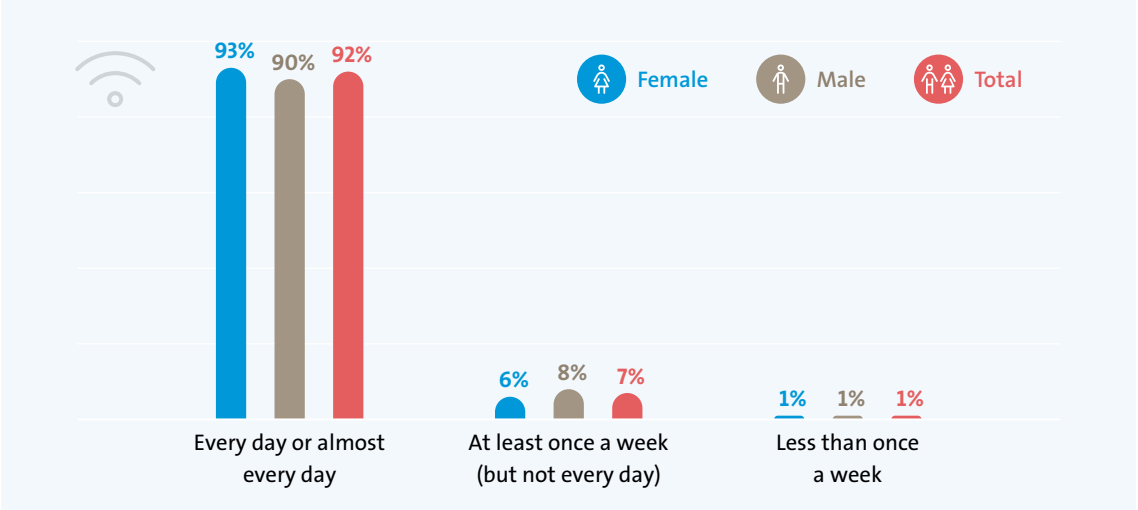


Source: Geostat 2017–2021d.

As for the frequency of Internet usage, according to Figure 3.9, a slightly higher portion of the female population used the Internet every day or almost every day in 2021 compared to the male population. On the other hand, a higher portion of the male population used the Internet at least once a week (but not every day) or less than once a week.[30] The statistics do not provide detailed insight into the purpose of Internet use.

FIGURE 3.9

Frequency of Internet use by the Internet-using population in Georgia, by gender, 2021



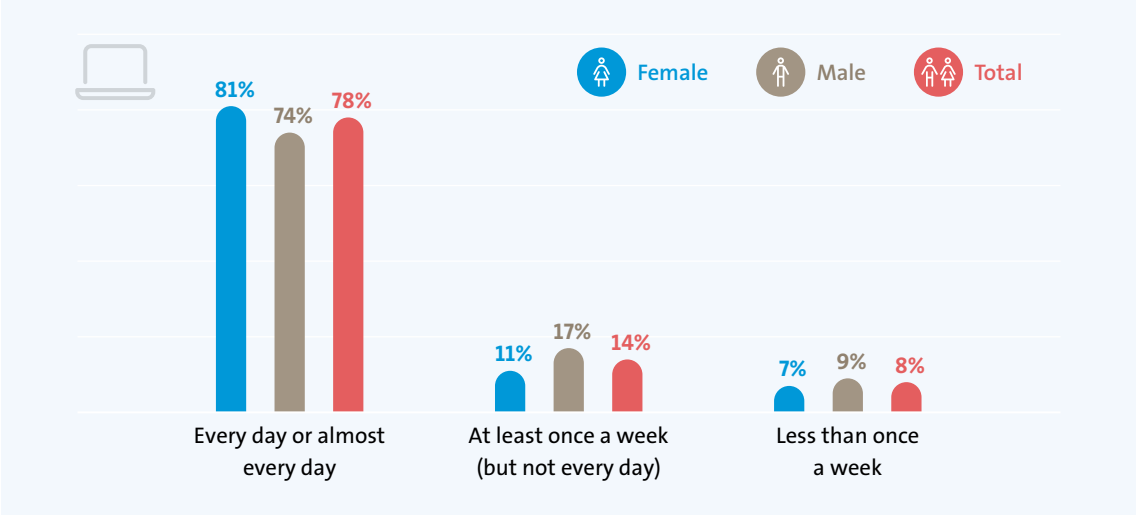
Source: Geostat 2017–2021b.

Overall, the gender balance for computer usage by individuals is very similar to that of Internet usage.

As demonstrated in Figure 3.10, a slightly higher portion of the female population used computers every day or almost every day in 2021 compared to the male population. On the other hand, a higher portion of the male population used computers at least once a week (but not every day) or less than once a week.[31] However, these figures do not provide insight into the purpose of use, whether it is work related or for entertainment purposes.

FIGURE 3.10

Frequency of computer use in Georgia, by gender, 2021



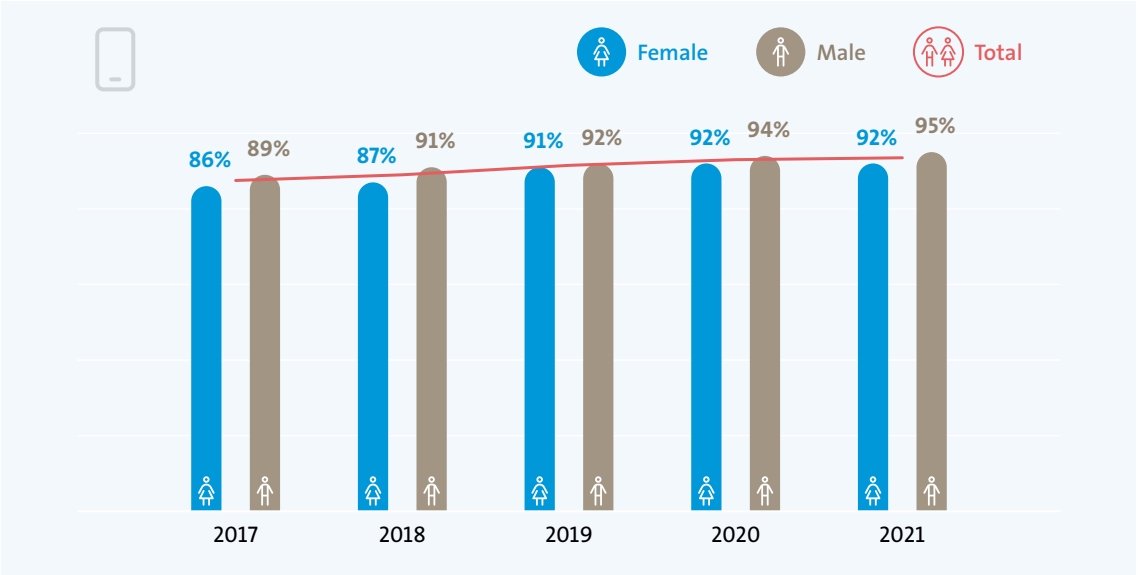
Source: Geostat 2017–2021a.

The vast majority of the population in Georgia uses mobile phones.

As seen in Figure 3.11, the share of the population who uses a mobile phone has slightly increased over the years. This growing trend is similar for both male and female mobile phone owners. In terms of usage figures by gender, there is only a small difference, with more male mobile phone users (95 per cent) than female users (92 per cent). This gap of 3 per cent stayed relatively constant between 2017 and 2021.[32] It should be noted that the data for mobile ownership only slightly differ from the usage data (on average by 7 per cent).[33] The reason for this small difference could be due to the individuals not having their own mobiles and instead using the phones of friends or family members.

FIGURE 3.11

Population in Georgia who uses a mobile phone, by gender, 2017–2021



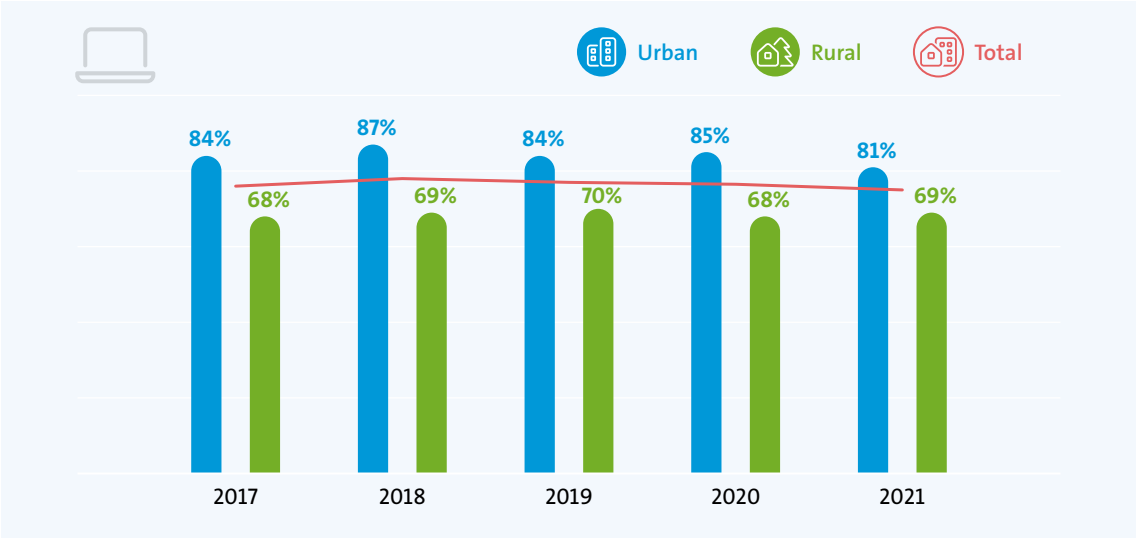
Source: Geostat 2017–2021f.

In rural areas, the indicators of computer and Internet usage are significantly lower than in urban areas.

Based on Figure 3.12, a notable digital divide in terms of place of residence has persisted over the years. The data reflect the disparity in Internet usage between rural and urban areas. Significantly more individuals living in urban areas use computers on a daily basis compared to those living in rural areas. There has been a slight improvement in this trend, with only a 12 per cent difference observed in 2021 as opposed to a 17 per cent difference in the previous years.[34] Such disparity might indicate poor access to digital infrastructure, in terms of affordability within rural areas compared to urban areas.

FIGURE 3.12

Daily and almost daily computer users in Georgia, by place of residence, 2017–2021



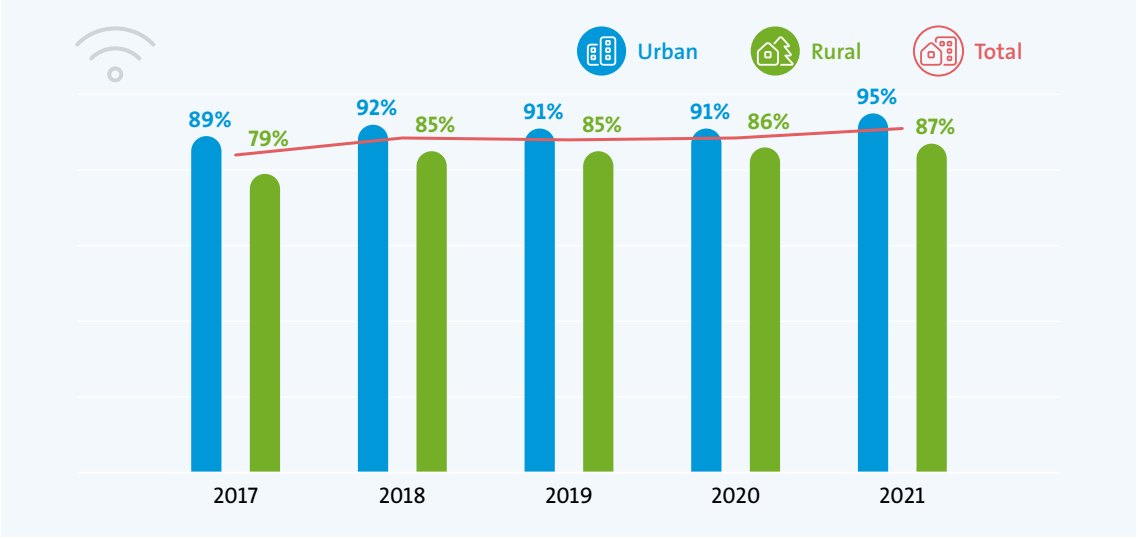
Source: Geostat 2017–2021a.

Note: The figure only includes individuals who have used a computer within the last three months.

Similar to computer usage, there is a digital divide between individuals living in urban areas and those living in rural areas. Nevertheless, this difference is relatively smaller for Internet usage than for computer usage.[35] This indicates that many individuals access the Internet via other digital devices like mobile phones. It also should be noted that over the years, the difference between urban and rural areas in terms of daily Internet usage has been significantly decreasing. However, in 2021, it again increased by 3 per cent compared to the previous year (Figure 3.13).[36] This change in the trend might be attributed to the increase in price of both mobile and fixed broadband Internet. Considering that the average monthly nominal income is 40 per cent less in rural areas than in urban areas,[37] the increase in Internet prices has a higher impact on the population living in rural areas.

FIGURE 3.13

Daily and almost daily Internet users in Georgia, by place of residence, 2017–2021



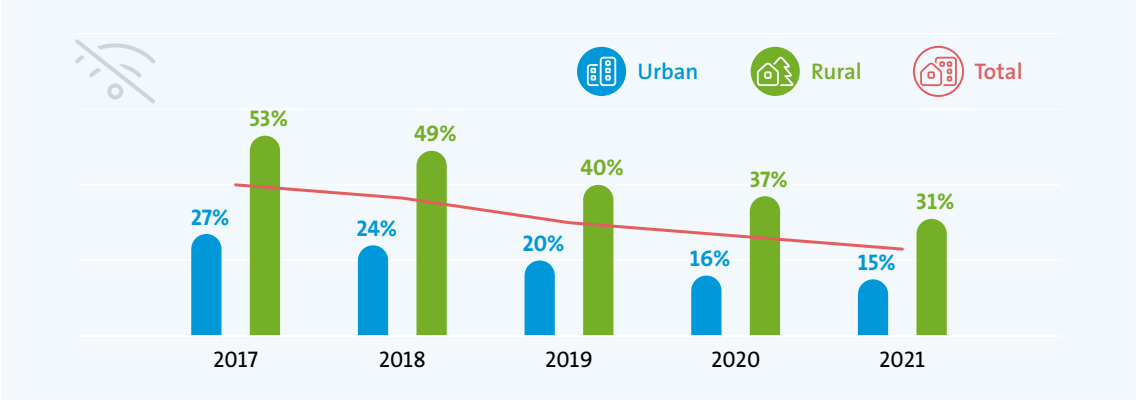
Source: Geostat 2017–2021b.

Note: The figure only includes individuals who have used the Internet within the last three months.

Contrary to the gender distribution of individuals who have never used the Internet, there is a significant digital divide between individuals living in urban areas and those living in rural areas (Figure 3.14). In 2021, only 15 per cent of individuals residing in urban areas had never used the Internet, as opposed to 31 per cent of citizens living in rural areas. Nonetheless, this digital divide has been steadily declining over the years, with only a 16 per cent difference reported in 2021 compared to the 26 per cent difference in 2017.[38]

FIGURE 3.14

Population in Georgia who has never used the Internet, by place of residence, 2017–2021



Source: Geostat 2017–2021d.

Future plans of the Government of Georgia – In order to overcome the COVID-19 pandemic-related crisis as well as ensure rapid economic recovery and development, the Government of Georgia developed the 2021–2024 Government Program "Toward Building a European State",[39] in which one of the top priorities concerns the use of ICT to develop Georgia's digital economy and information society. The list provided below includes future initiatives that the Government is planning on implementing in this direction:

- In line with the 2020–2025 National Strategy for the Development of Broadband Networks of Georgia, the state programme for supporting the development of broadband infrastructure will continue. Households and administrative bodies will have access at a minimum rate of 100 megabytes per second and 1 gigabytes per second, respectively, which will allow half a million residents in almost 1,000 settlements to enjoy high-quality Internet.
- Under the World Bank's Log-in Georgia project, policy legislation is being upgraded to support broadband networks and services, measures to attract investment to the sector, nationwide training and capacity-building programmes, assistance to persons with disabilities in using Internet and digital services, and other initiatives.
- Measures to support the provision of community-level access to the Internet are continuing, with the goal of providing the country's mountainous regions with Internet connectivity.
- Using the broadband telecommunications infrastructure, transit will be used to its maximum potential, and measures will be taken to create a digital transit hub connecting Eurasia via Georgia.
- The harmonization of the legislative and normative frameworks for electronic communications and postal services with the EU directives is taking place, with the goal of integrating Georgia's digital market into the single EU digital market.
- The Long-Term National Strategy for the Development of a Digital Economy and Information Society and its implementation plan will be developed and approved. With the coordination and engagement of all relevant governmental and private organizations, the respective activities will be carried out to reach the following goals:
  - Promote the development of digital services in the public and private sectors
  - Enhance digital literacy
  - Step up the process of establishing an information society
  - Grow the export of advanced technologies
  - Strengthen the development of research and innovation
  - Upgrade Georgia's competitiveness in the global digital economy

3.1.3 ICT education in Georgia

For a variety of reasons, women continue to be severely underrepresented in the ICT education field in Georgia. Some of the data obtained from Geostat imply strong variations across the education statistics by gender. Geostat provides the education data related to admissions and intakes of graduates to 'computing programmes'.[40] In this analysis, 'ICT programmes' are used as equivalent to computing programmes.

Georgia's population ranks lower in digital skills when compared to the world, region and similar income group country average scores (Table 3.3). However, a higher share of students in Georgia expect to work as ICT professionals when compared to students from OECD countries' average indicator. The indicator for girls is significantly lower than that for boys, with 15 times more boys expected to work as ICT professionals (Table 3.4).

TABLE 3.3

Index scores denoting the extent of digital skills among populations

Name of the index	Georgia	Regional average	Income group average	World average	Description of the index
Global Competitiveness Index 4.0: Digital skills among population, score (0–100, higher is better) (*Source:* WEF 2019)	44.27	61.16	50.51	53.39	A component indicator used in the 'Skills of Current Workforce' component of 'Current Workforce' within Pillar 6 (Skills) of the Global Competitive Index 4.0. It is based on a survey question that asks: "In your country, to what extent can companies find people with the skills required to fill their vacancies?" All GCI scores are normalized using a min-max approach to a unit-less progress score ranging from 0 to 100, where 100 is the ideal score.

Note: Assigned scores range from 0 to 100, with a higher score assigned to better performers.

TABLE 3.4

Index scores denoting students' expectations to work as ICT professionals

Name of the index	Georgia	OECD average	Description of the index
PISA 2018: Students expecting to work as ICT professionals at age 30 (15-year-olds, percentage) (*Source:* OECD 2018)	5.2	4.1	PISA is the OECD's Programme for International Student Assessment. PISA measures 15-year-olds' ability to use their reading, mathematics and science knowledge and skills to meet real-life challenges.
PISA 2018: Girls expecting to work as ICT professionals at age 30 (15-year-olds, percentage) (*Source:* OECD 2018)	0.7	0.8	
PISA 2018: Boys expecting to work as ICT professionals at age 30 (15-year-olds, percentage) (*Source:* OECD 2018)	10.2	7.6	

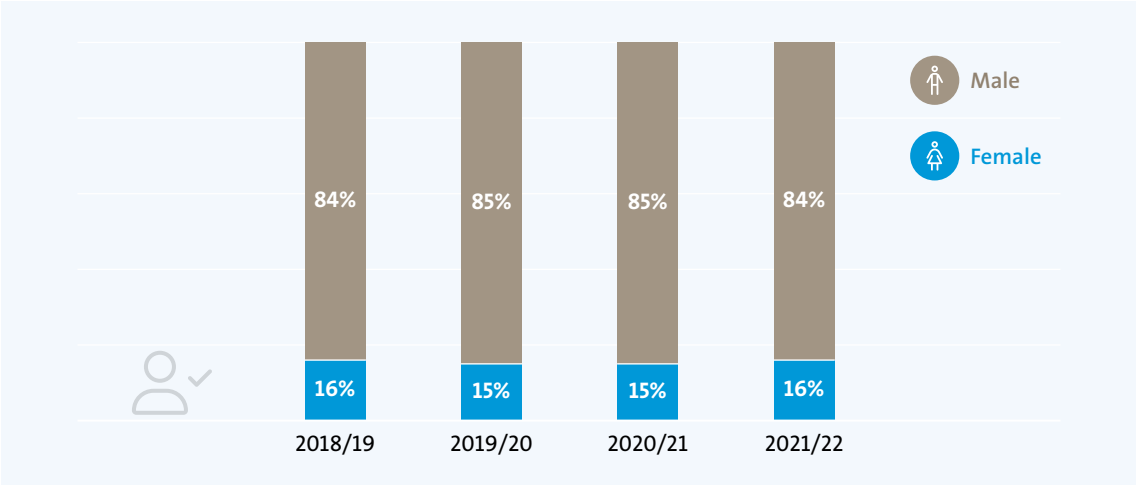
Note: The indicator measures the share of students in the country that plans to work as ICT professionals at age 30.

The gender balance of admissions to ICT programmes stays strongly male dominated, with only around 16 per cent of students being female.

As seen in Figure 3.15, the share of male students admitted to ICT programmes is higher than that of females, which was only 16.42 per cent in 2021/22 (343 female students in total).[41]

FIGURE 3.15

Gender balance of the students admitted to ICT bachelor's programmes



Source: Geostat 2018–2022.

Despite the increase in demand for ICT professionals, awareness among the younger generation about the ICT sector and its benefits (e.g. it being a growing sector with above-average wages) remains very limited. According to the conducted IDIs and FGDs, there is a low level of awareness among the female applicants with regard to enrolling in ICT courses; this is also reflected in the secondary data. Insights from the IDIs and FGDs demonstrate that two major issues related to low admission rates are related to the pre-admission process: (1) lack of awareness and (2) stereotypes related to male and female professions. Participants of the FGD with school students both from the regions and from Tbilisi emphasized that ICT is a new profession, that they and their parents have limited information about the sector and that they consider it risky for them to invest four years of education without clarity about future employment prospects in this sector. Respondents stated that the Government has a significant role to play in terms of both increasing awareness at the primary education level and working on issues around stereotypes.

> "Social stereotypes combined with a lack of confidence is one of the major problems for women in accessing the ICT market."
>
> —ICT expert

The low female admission rates are evident at both universities and VET colleges. No gender-specific student targeting initiatives were identified during the IDI process. Only two of the universities that took part in the survey have designated actions related to gender equality and social inclusion.

Although there is a growing number of female students in certain educational institutions, respondents highlight the tendency for more technical programme[42] choices among male students and more design-related programmes among female students. Respondents also indicated that there is a tendency for women, especially in the regions, to choose programmes with more female students.

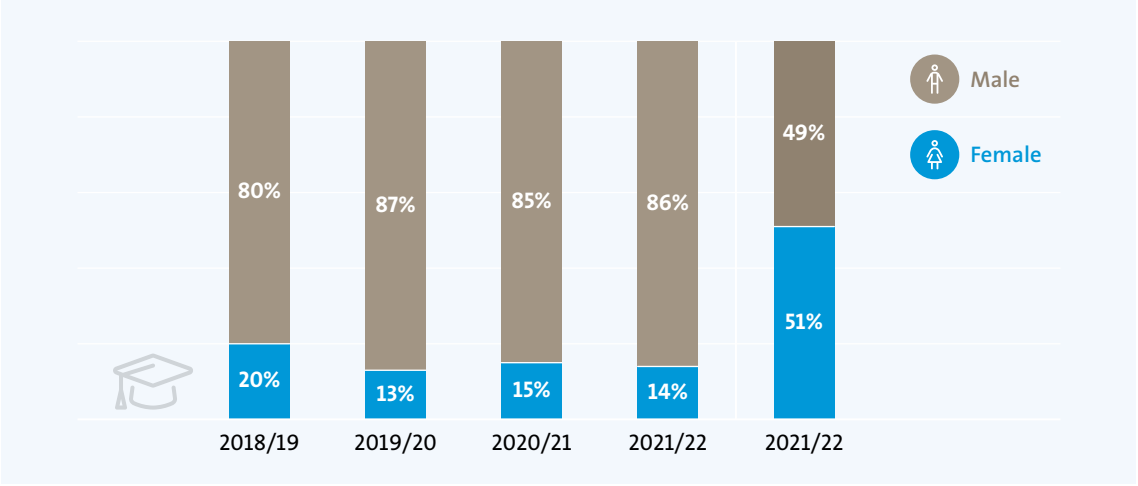
Various donor and government initiatives are focusing on increasing women's engagement in the ICT sector, with a major focus on skill development by providing access to training and certification courses.

The situation in terms of gender balance for the students currently in ICT programmes is quite similar to the admissions' statistics.

According to Geostat, in 2018/19, only 20 per cent of female students were pursuing education programmes in ICT (Figure 3.16). However, this share dropped in subsequent years to 13.3 per cent in 2019/20, 14.8 per cent in 2020/21 and 14.2 per cent in 2021/22 (to a total of 1,210 female students in 2021/22).[43] In contrast, based on Figure 3.17, a more positive gender-balance trend is observed among the VET students studying in ICT programmes. In 2021, only 14 per cent of female students were studying in ICT bachelor's programmes compared to the 29 per cent of female students in VET programmes. According to the IDIs, there are more initiatives and capacity-building activities directed towards VET colleges that include gender components, which facilitates increased involvement of female students in VET programmes. On the other hand, based on the responses from IDIs, universities lack such gender-oriented initiatives. This could be the reason as to why a higher share of female VET students are studying in ICT programmes compared to female bachelor's students.

FIGURE 3.16

Gender balance of the students in ICT bachelor's programmes

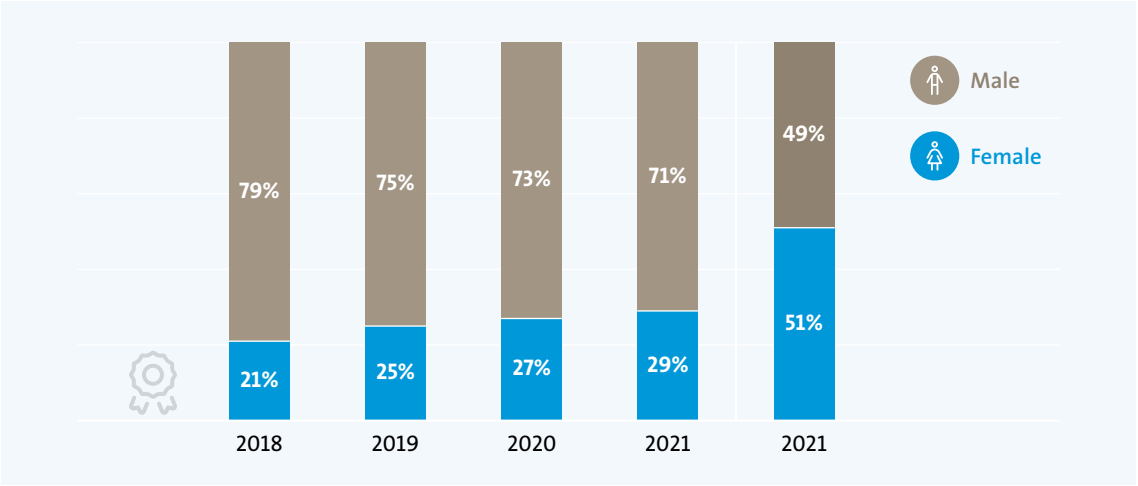


Source: Geostat 2018–2022.

Note: The last column shows the gender balance of all students in ICT bachelor's programmes in 2021/22.

FIGURE 3.17

Gender balance of the students in ICT VET programmes



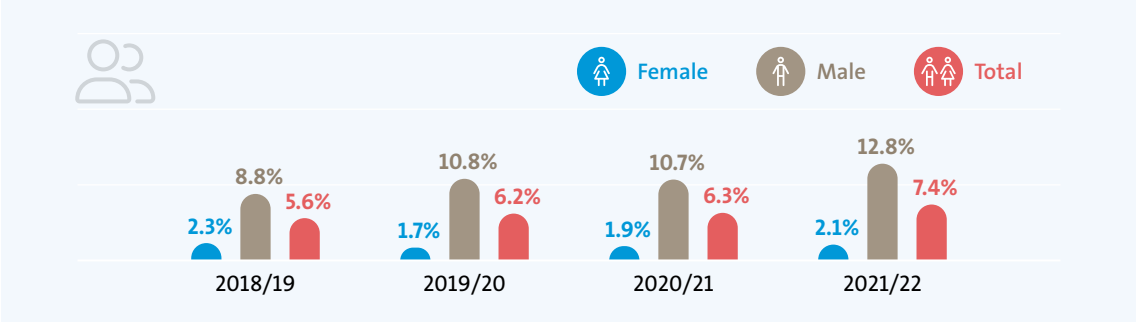
Source: Skills Agency Georgia 2017–2021 (document provided to author).

Note: The last column shows the gender balance of all students in ICT VET programmes in 2021.

Figure 3.18 demonstrates that the share of all students studying in ICT bachelor's programmes grew steadily from 2018/19 to 2021/22.[44] There is a positive trend in the growth of the number of male students: almost 9 per cent of male students studied in ICT programmes in 2018/19, whereas the number reached 12.76 per cent in 2021/22 (growing from 5,002 students in 2018/19 to 7,326 students in 2021/22). However, the trend for female students is not in line with the overall growth trend: their share even fell slightly, from 2.3 per cent in 2018/19 to 2.06 per cent in 2021/22 (from 1,255 students in 2018/19 to 1,210 students in 2021/22).[45]

FIGURE 3.18

Share of students in ICT bachelor's programmes (by gender) compared to students in all bachelor's programmes (total)



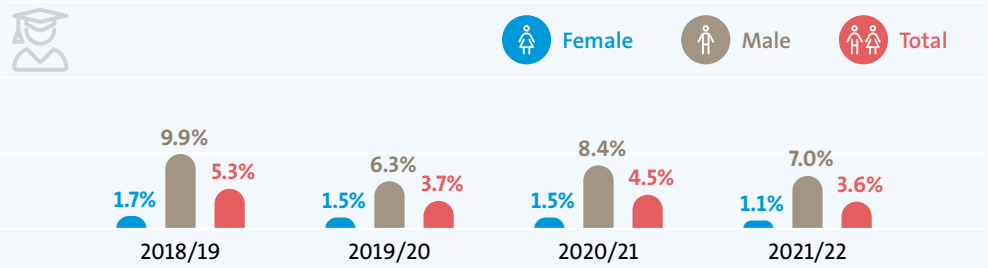
Source: Geostat 2018–2022.

In terms of absolute value, the number of female graduates dropped steadily starting from 2018.

The secondary data demonstrate that overall, there is a drop in the share of graduates from ICT bachelor's programmes compared to the total number of graduates, as demonstrated in Figure 3.19. The same applies for female graduates, starting from 1.7 per cent in 2018/19 to 1.08 per cent in 2021/22.[46] In 2021/22, only 110 female students graduated from ICT bachelor's programmes compared to 161 in 2018/19. It is important to understand whether the lower rate of graduates was due to the lower rate of admissions, the high drop-out rate or the high transfer rate of the female students.

FIGURE 3.19

Share of graduates from ICT bachelor's programmes (by gender) compared to graduates from all bachelor's programmes (total)



Source: Geostat 2018–2022.

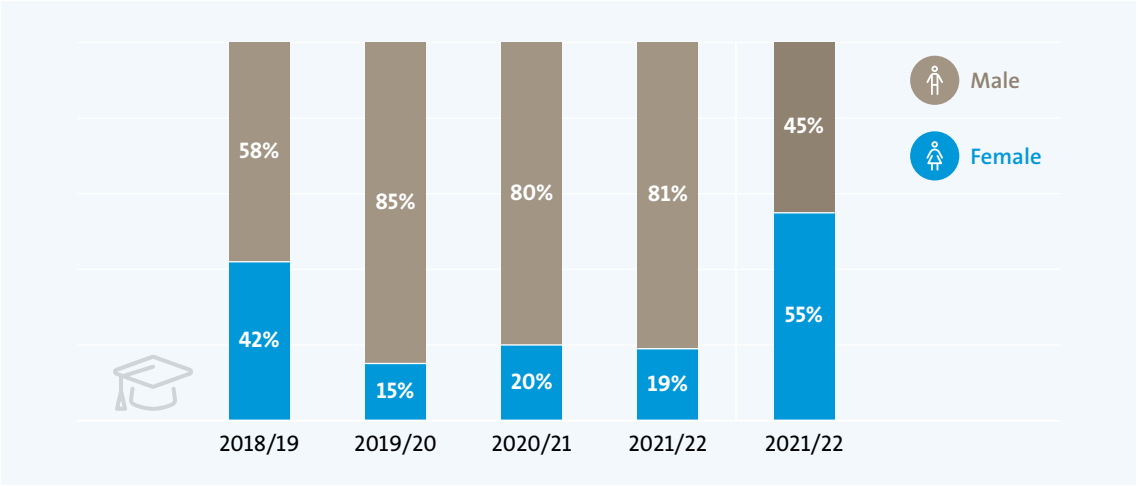
There is a more positive trend in terms of gender balance among the ICT master's programme students compared to the ICT bachelor's programme students.

As seen in Figure 3.20, there is an even higher fluctuation in the master's programmes compared to the bachelor's programmes in relation to the gender balance across the years from 2018/19 to 2021/22. In 2018/19, 42 per cent of master's students were female. The share dropped sharply to 15 per cent in 2019/20 and reached 20 per cent in 2020/21 and 19 per cent in 2021/22 (to a total of 147 female students in 2021/22).[47] On the other hand, according to the data, the share of students studying in master's programmes is higher for female students than for male students, with a gender balance of 55 per cent and 45 per cent, respectively. It should be noted that these data are characterized as having higher variance due to the low number of students in the master's programmes.

Larger differences across the years are due to the fact that there is a high variance in the number of students in ICT master's programmes. According to the IDIs, there are fewer barriers for more advanced and experienced ICT female professionals as they are already on a career development track in the ICT sector. It should also be noted that gender variance in bachelor's programmes is more detrimental as they are the gateway for employment in the industry.

FIGURE 3.20

Gender balance of the students in ICT master's programmes



Source: Geostat 2018–2022.

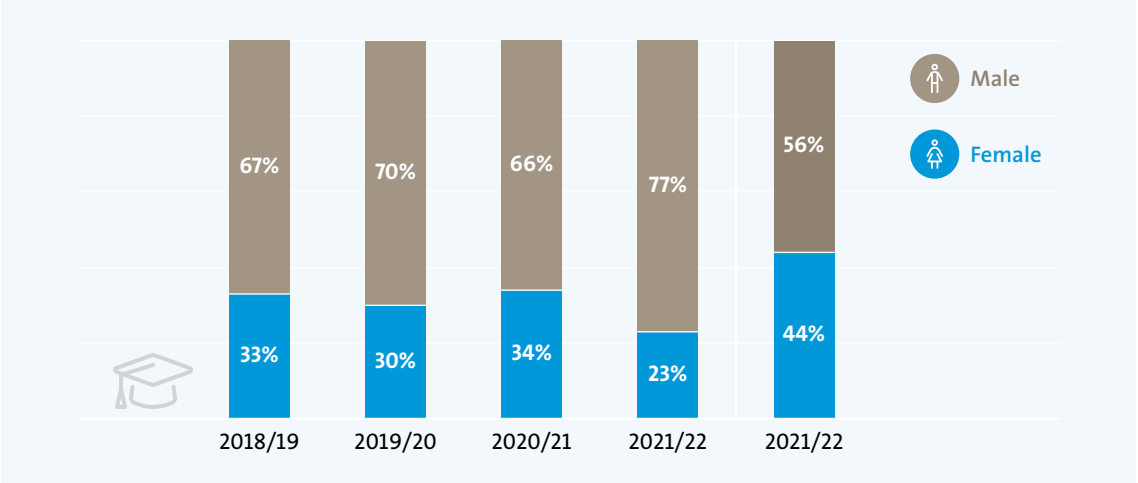
Note: The last column shows the gender balance of all students in ICT master's programmes in 2021/22.

To further understand the high variance in the number of students in the ICT master's programmes, data were obtained regarding the number and type of ICT programmes that higher education institutions offer in Georgia. In particular, out of 19 universities offering ICT bachelor's programmes, only nine also have a master's programmes. The low number of ICT students in the master's programmes is caused not only by the lower level of demand from master's students than from bachelor's students but also by the low level of availability of master's programmes at universities in Georgia. As mentioned above, according to the primary research, there are two main reasons for the low level of (female) students in the master's programmes, namely (1) the low number of students interested in the postgraduate programmes, due to the fact that employers demand more practical skills than academic degrees; and (2) the low number of postgraduate programmes available in the education market.

In contrast to the gender distribution of all master's programme students, the share of male PhD students (56 per cent) is higher than that of female students (44 per cent). On the other hand, according to Figure 3.21, there is a more positive gender balance in ICT PhD programmes compared to the ICT bachelor's programmes as well, with better rates in each of the years from 2018/19 to 2021/22.[48] According to the IDIs and FGDs, the reason for this might be the fact that women with higher levels of education and experience have more self-confidence and fewer barriers to getting involved in advanced studies. Another reason for having a small number of ICT PhD admissions also comes from the low level of demand from potential students and of supply from universities, with only five of them offering ICT PhD programmes. The reason behind this finding can be related to the fact that PhD degrees in ICT programmes are beginning to become less relevant for employers, who demand and reward more practical skills nowadays.

FIGURE 3.21

Gender balance of the students in ICT PhD programmes



Source: Geostat 2018–2022.

Note: The last column shows the gender balance of all students in ICT PhD programmes in 2021/22.

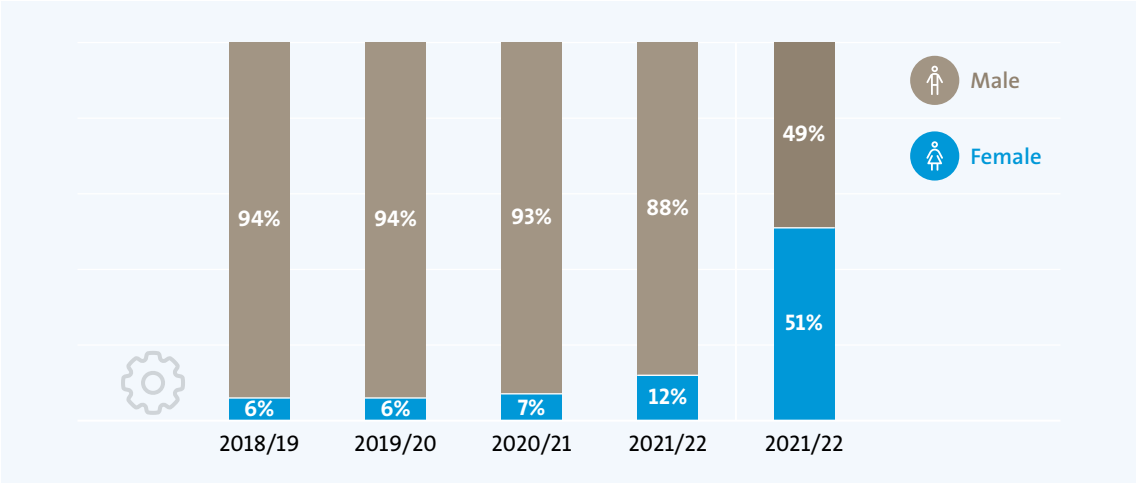
The trend in ICT education is comparable to other technical sectors, such as engineering, where the gender gap is even wider.

When the gender balance of students in engineering is compared with the ICT sector, it is even lower in any of the academic years between 2018/19 and 2021/22. However, as seen in Figure 3.22, the share of female students grows from 2020/21 (7.14 per cent) to 2021/22 (12.04 per cent).[49] The reason for it is the significant increase in the number of admitted female students in 2021/22.

Traditionally these sectors are strongly male dominated, not only in Georgia but also worldwide. The IDI and FGD participants indicated that stronger emphasis must be placed on attracting female students to the programmes as well as providing subsequent support during their studies.

FIGURE 3.22

Gender balance of the students in engineering bachelor's programmes



Source: Geostat 2018–2022.

Note: The last column shows the gender balance of all students in engineering bachelor's programmes in 2021/22.

3.1.4 Employment in the ICT sector

Due to the method of reporting employment in ICT together with other subsectors that are not directly related to the definition of ICT for the purpose of this research, it is not possible to estimate current employment figures in the ICT sector.

Geostat defines the ICT sector according to the Information and Communication section of the NACE Rev. 2 classification,[50] which broadly includes the following components:

1. Publishing activities
2. Motion picture, video and television programme production, sound recording and music publishing activities
3. Programming and broadcasting activities
4. Telecommunications
5. Computer programming, consultancy and related activities
6. Information service activities

According to the IDI respondents, the employment figures in the sector have increased over the past five years and will continue to grow. The growth is mainly driven by interest from foreign investors towards ICT professionals in Georgia. However, the scale of growth will be determined by the pace of supply of the ICT workforce as well as the quality of their skills.

Increased demand in the ICT sector leads to high competition for skilled ICT professionals and drives up wages in the sector.

According to the IDIs with private sector representatives, there is a deficit in the labour force, both in terms of the number of professionals and the quality of their skills. This deficit is further amplified by the ease with which ICT professionals' skills can be exported, which leads to above- average market wages and makes ICT a high-income profession in Georgia. Although there is a growing trend in overall ICT admission, it is still not aligned with the growing market demand. One of the key reasons is related to the lack of awareness about the ICT profession among the younger generation.

The quality of education in general was also highlighted as a considerable concern during the IDIs with company representatives and experts. The issue is not unique to Georgia and can be divided into two broad categories:

1. The fast pace of change and development of the ICT sector requires a constant update of the education curriculum. Since the accreditation process of new programmes can take considerable time, educational institutions cannot follow the pace of the private sector company requirements. As a result, a significant portion of businesses are focusing more on on-the-job training education, while selective companies are establishing their own training facilities.
2. Wages in the educational field in Georgia are considerably lower than those in private companies in the ICT sector. High wages offered by the business sector to qualified ICT specialists put pressure on educational institutions to attract and retain tutors and professors. It is important that lecturers' experience and up-to-date knowledge is aligned with the constantly evolving trends and skills in the ICT sector. Some of the respondents indicate that this increases reliance on part-time lecturers who cannot offer sufficient stability to educational institutions.

The IDI respondents emphasize the positive trend in cooperation between private sector and educational institutions in terms of information exchange related to the skills gap in the market. Still, there is no systematic and unified approach related to aligning private sector needs in terms of the extent of the workforce demand as well as the specific skill requirements.

More granular subsector reporting of employment statistics in the ICT sector is needed to analyse the female participation rate in the ICT business sector.

Growing demand for ICT professionals amplifies the need for women's engagement in the ICT sector to further reduce the supply gap. Overall, all respondents agree that there are fewer barriers for women to enter the ICT workforce, provided that they have the skills required for the market. University representatives emphasize that the job postings that they receive are gender neutral and do not emphasize preference for either gender.

> "Gender balance is most proportional in the virtual world where competition is only [based on] IQ and skills, in which men and women are equal. There is no logical barrier as to why women should not be in this sector—only stereotypes that exist in society."
>
> —Government organization

Regarding the composition of the ICT sector according to the NACE Rev. 2 classification,[51] some of the female employees employed in the sector do not work in technical professions directly related to IT, such as publishing activities, programming and broadcasting activities, and others. Therefore, further research is required to analyse employment by profession and position, for which data are not available as of now.

IDI participants highlighted that the ICT sector remains vastly male dominated, especially in the higher positions. All IDI respondents (experts and representatives of the private sector and educational institutions) categorize the root cause of the gender divide into three key areas: (1) gender stereotypes in society; (2) the lack of awareness related to ICT professions that, together with prevailing stereotypes, results in a limited number of female students in ICT education; and (3) the limited access to financing for women, which affects the number of women in the top positions.

3.2 PRIMARY RESEARCH

This section focuses on the findings of the primary research. The section starts by describing the profile of the online survey participants. Next, the analysis of responses provided by the online survey participants is grouped by the four main areas of the survey topics: access to ICT infrastructure; skills and education; employment and career plans; and challenges and barriers. Finally, insights from the IDIs and FGDs are provided alongside the key findings to corroborate the study findings.

3.2.1 Profile of the online survey participants

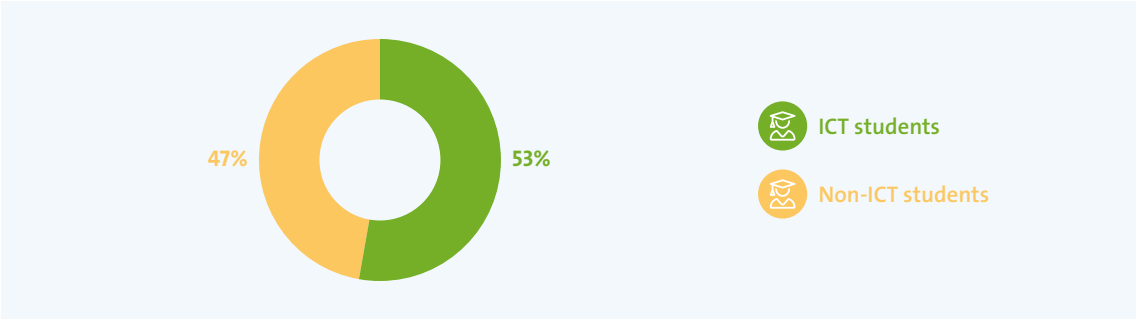
The online survey was completed by students of higher education institutions and VET colleges from different regions of Georgia.

The primary focus of the online survey was to understand the barriers faced by students in ICT fields. Thus, the first question about their field of study was asked to filter for the students in the ICT programmes. Participants who responded that they were studying in another (non-ICT) field were asked a question related to their reason for not choosing ICT as their field of education.[52] The rest of the questions were targeted towards the students in the ICT field only.

The total number of respondents was 360, of whom 53 per cent were ICT students (190 participants) and 47 per cent (170 participants) were students representing other fields (Figure 3.23). The following analysis is based on the responses of ICT students from various higher education institutions and VET colleges.

As demonstrated in Figure 3.24, nearly half of the survey participants were female students (52 per cent of all respondents), and 48 per cent were male students. Moreover, 90 per cent of survey participants were single, and nearly 8 per cent indicated "married" as their family status (Figure 3.25).

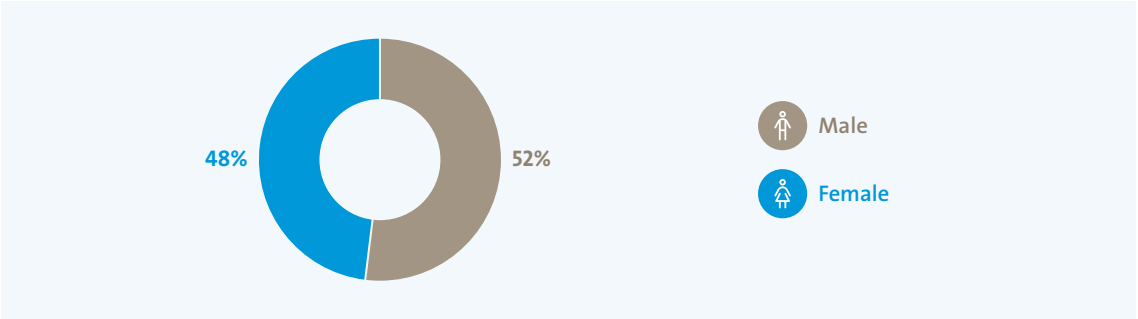
FIGURE 3.23
ICT versus non-ICT participants



n = 360 (where n equals the number of responses to each particular online survey question); Question 1 – Are you studying in the field of ICT?

FIGURE 3.24

Gender profile of ICT students



n = 190; Question 2 – Please indicate your gender.

FIGURE 3.25

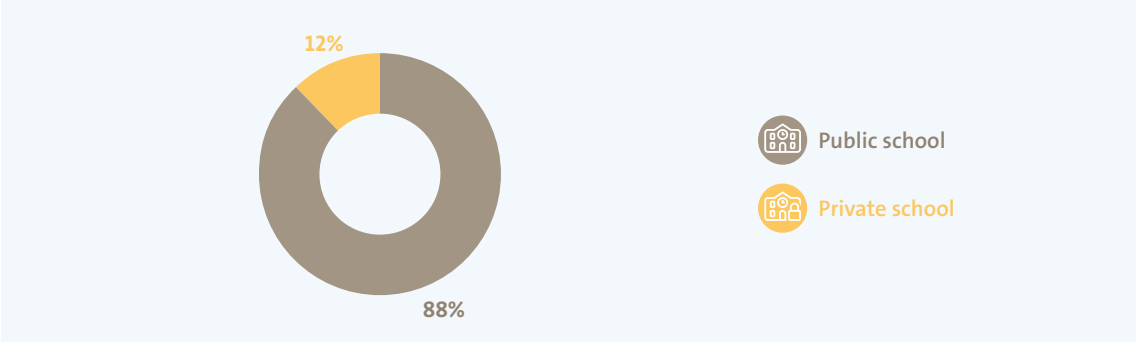
Family status

n = 190; Question 3 – Please indicate your family status.

The online survey was mostly completed (88 per cent) by students who attended public school during their general secondary education years (Figure 3.26). As demonstrated in Figure 3.27, a diverse group of students participated in the survey according to their place of residence during their school education years. The largest portion of students live in Tbilisi (46 per cent), nearly one third of participants (35 per cent) live in cities other than Tbilisi, and the remaining students (19 per cent) live in rural parts of Georgia.

FIGURE 3.26

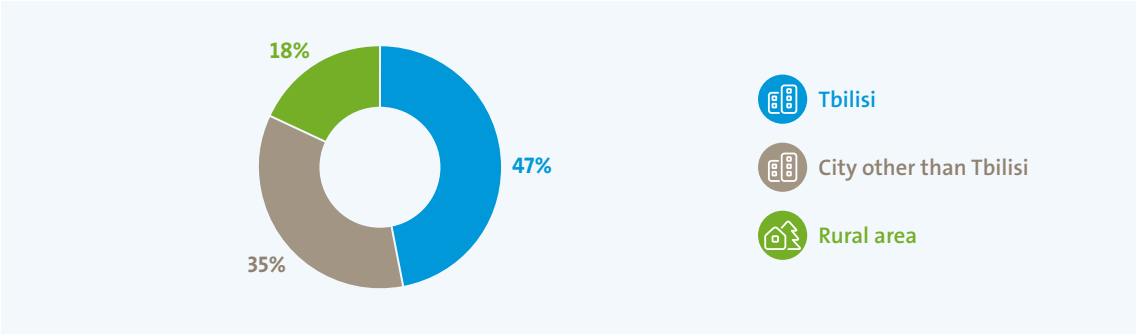
Type of the school



n = 190; Question 11 – Which type of school did you attend?

FIGURE 3.27

Place of residence during school



n = 190; Question 12 – Please indicate where you lived during your school years (i.e. where you spent most of your general secondary education years).

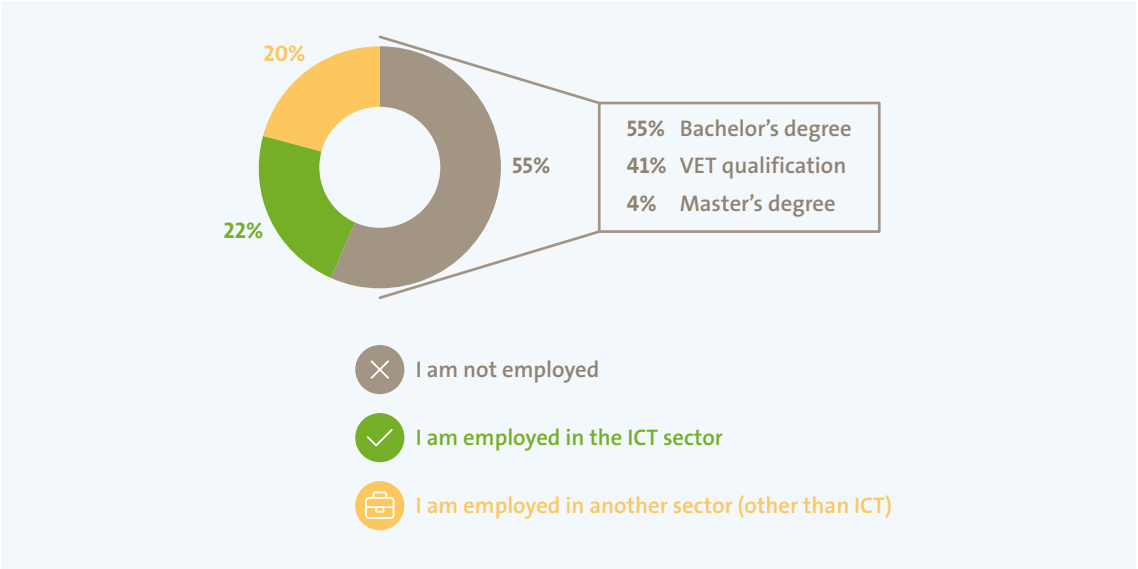
The majority of respondents are students from higher education institutions, specifically bachelor's and master's degree students (67 per cent and 9 per cent, respectively), while 24 per cent of survey participants are students of VET colleges.

A significant proportion (70 per cent) of the respondents are studying in public education institutions (higher education institutions and VET colleges), while the remaining students (30 per cent) are studying at private education institutions.

As demonstrated in Figure 3.28, more than half of the respondents (55 per cent) indicated that they are currently unemployed. Only a small number of students responded that they are employed in the ICT sector (22 per cent), while the remaining respondents are employed in sectors other than ICT (23 per cent).

FIGURE 3.28

Employment status



n = 190; Question 5 – Please indicate your employment status and sector.

3.2.2 Access to ICT infrastructure

The ICT sector requires a good command of computer skills, which is important both for formal education and for employment in the sector. Considering the importance of access to ICT infrastructure, the online survey covered questions regarding the access to computer use, access to mobile phone use and access to the Internet during the last year of their school education years and as of now (after the start of their formal education in the ICT field).

Fewer female survey participants had daily access to computer use during the last year of their school education compared to male participants, especially in rural parts of Georgia. Access to mobile phones and Internet use is not a significant barrier. Daily access to the digital infrastructure significantly increases after students enter the ICT educational field.

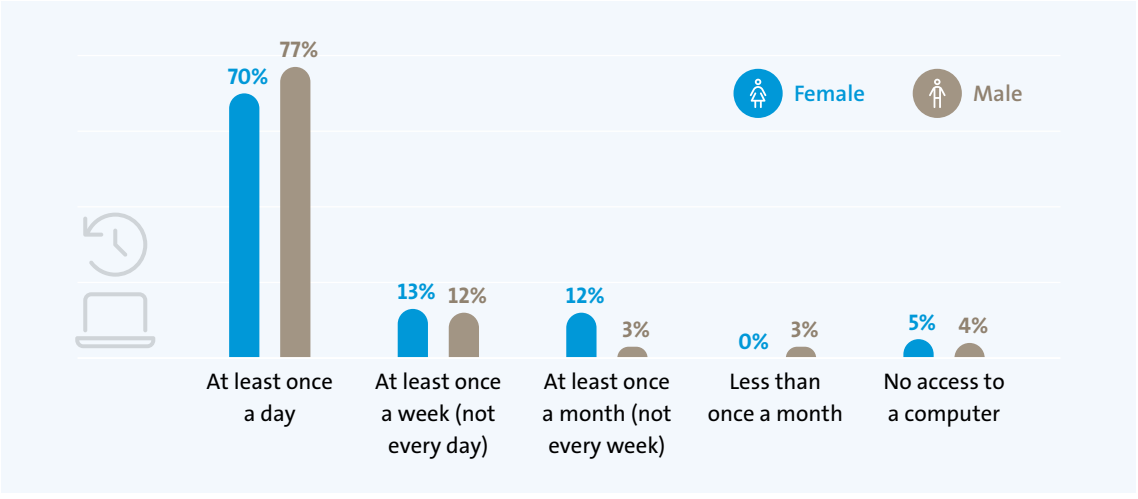
As demonstrated in Figure 3.29 and Figure 3.30, the majority of the respondents used a computer at least once a day, with a higher number of male respondents using computers on a daily basis during their higher education years. The trend of increased frequency in accessing a computer has further improved after respondents started their formal education in ICT courses, with the majority of respondents indicating that they use a computer either on a daily basis or at least once a week (95 per cent of female and 89 per cent of male participants). The share of responses indicating no access or less frequent access to computer use as of now is negligible (nearly 2 per cent).

The frequency with which female students access a computer has also improved. As it can be observed in Figure 3.29 and Figure 3.30 below, 70 per cent of female participants indicated that they had access to computer use at least once a day in the last year of their school education, while 95 per cent of female students have access to daily computer use as of today, which is higher than the daily use reported by male students (89 per cent). As for the male participants, 77 per cent responded that they had access to computer use at least once a day, while 89 per cent have daily access as of today.

During the FGDs, university and VET college students highlighted that despite the fact that they had access to a computer at home, their schools do not have a sufficient number of computers for the students and that they were not able to gain relevant computer skills at the school level.

FIGURE 3.29

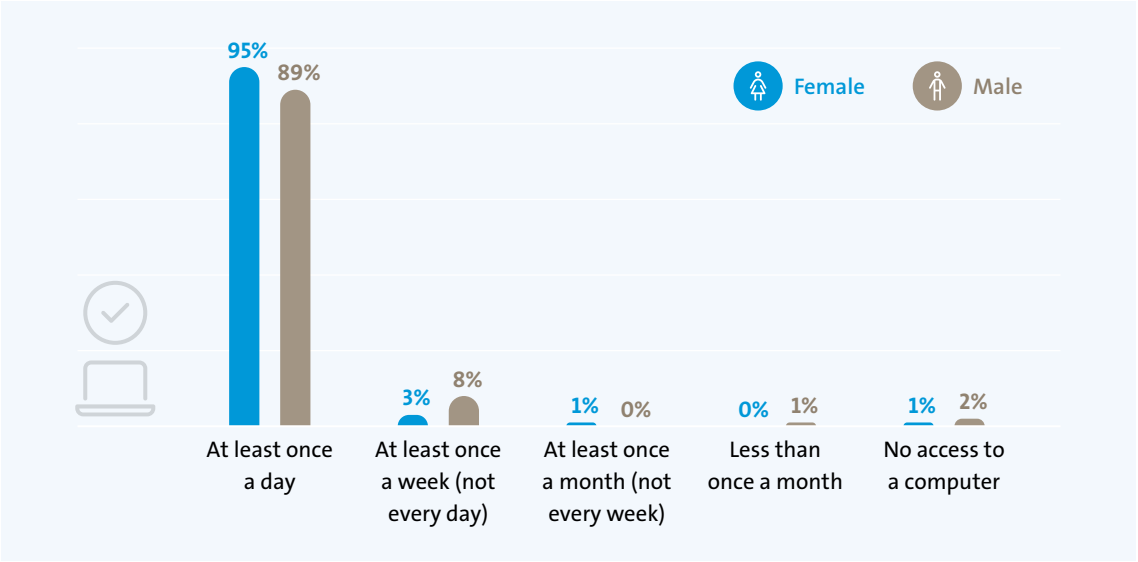
Frequency of access to computer use (last year of school education), by gender



n = 190; Question 15.a – Please indicate the frequency of your access to computer use during the last year of your school education (general secondary education).

FIGURE 3.30

Frequency of access to computer use (as of now), by gender

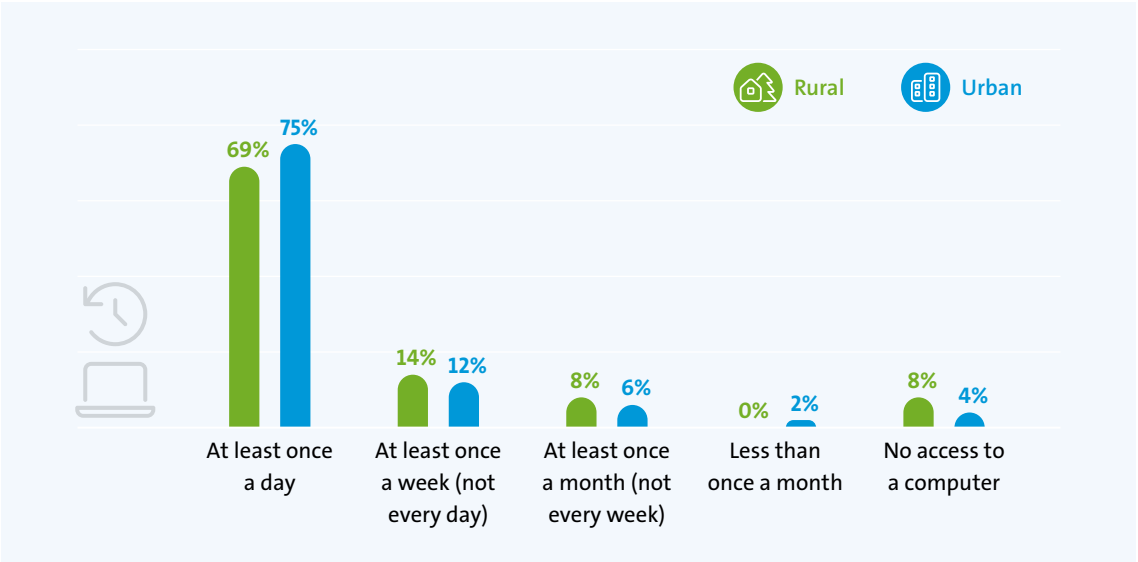


n = 190; Question 15.b – Please indicate the frequency of your access to computer use after enrolling in the education institution.

According to Figure 3.31 and Figure 3.32, students from rural parts of Georgia had less frequent daily access to computer use (69 per cent) than students from the urban parts (75 per cent). The increasing trend of computer use can be observed after enrolment at a university or VET college. In terms of access to mobile phone use or Internet use, no significant deviations were identified between students from the rural and urban parts of the country.

FIGURE 3.31

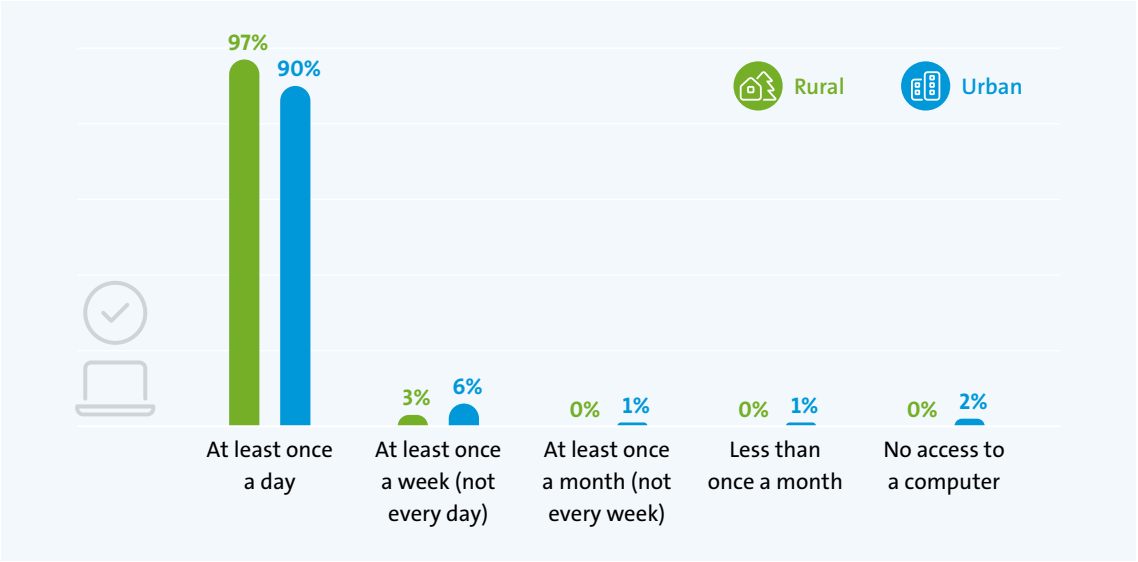
Frequency of access to computer use (last year of school education), by place of residence



n = 190; Question 15.a – Please indicate the frequency of your access to computer use during the last year of your school education (general secondary education).

FIGURE 3.32

Frequency of access to computer use (as of now), by place of residence

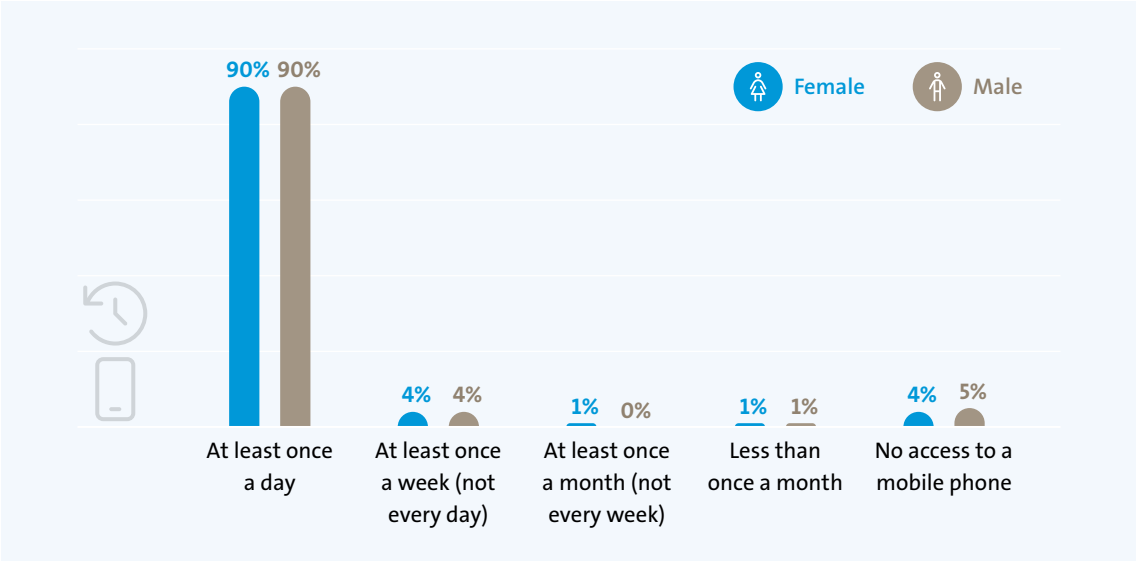


n = 190; Question 15.b – Please indicate the frequency of your access to computer use after enrolling in the education institution.

As it can be observed in Figure 3.33 and Figure 3.34, the increasing trend is similar in terms of access to mobile phones as well. The frequency of mobile phone use among students increased after joining educational programmes. Nearly the same share of female and male respondents had daily access to a mobile phone during their last year of school education; however, a slight increase is noted in female participant responses than in male responses currently (96 per cent of female and 93 per cent of male respondents currently have at least daily access to mobile phone use).

FIGURE 3.33

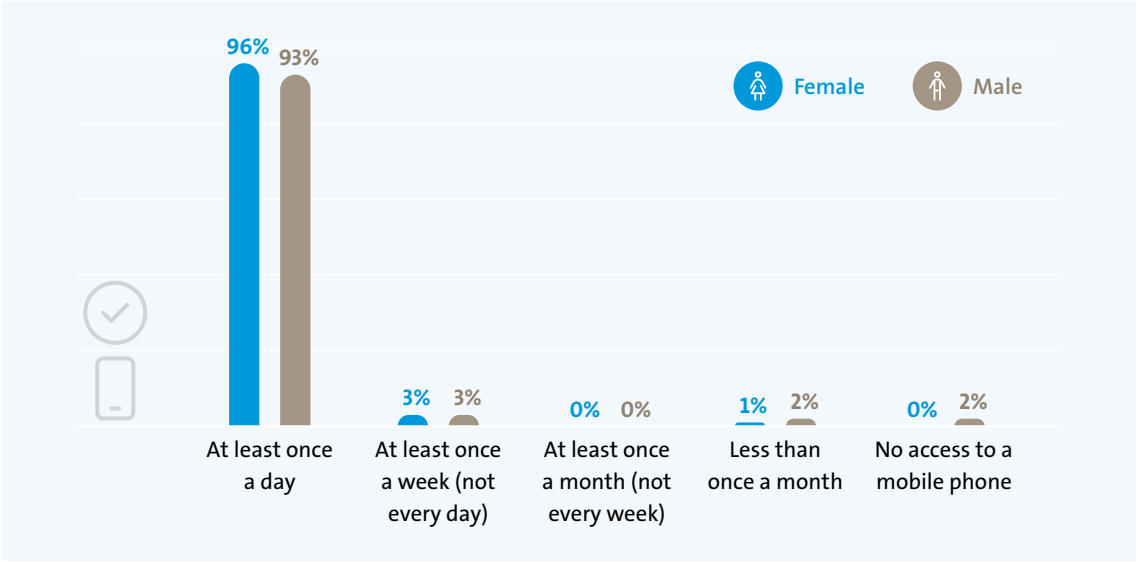
Frequency of access to mobile phone use (last year of school education), by gender



n = 190; Question 16.a – Please indicate the frequency of your access to mobile phone use during the last year of your school education (general secondary education).

FIGURE 3.34

Frequency of access to mobile phone use (as of now), by gender

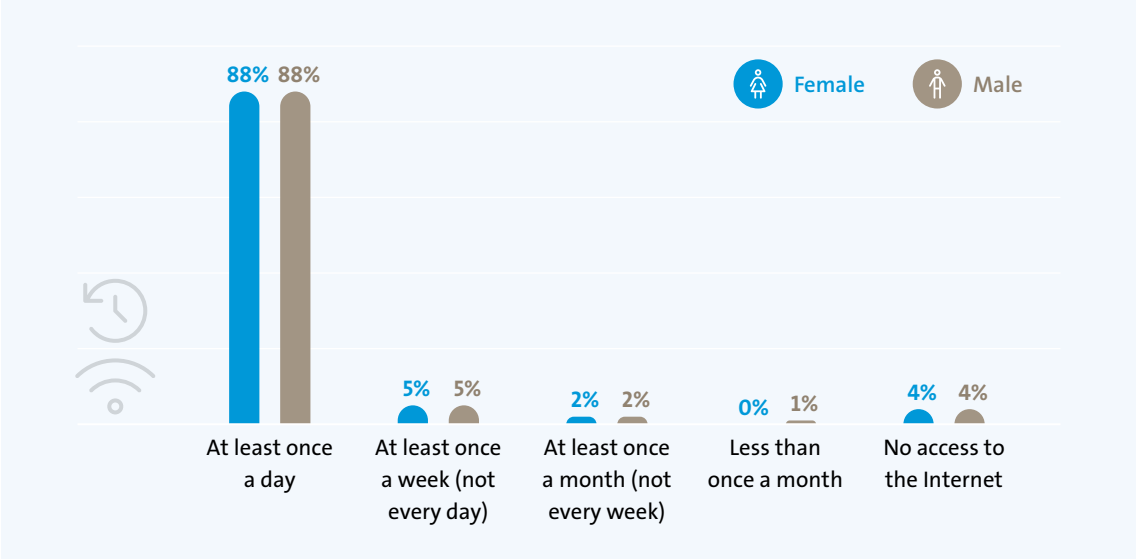


n = 190; Question 16.b – Please indicate the frequency of your access to mobile phone use after enrolling in the education institution.

As it can be observed in Figure 3.35 and Figure 3.36 below, the situation is quite similar in terms of the frequency of Internet use among students as well, with 88 per cent of all respondents indicating that they had access to the Internet at least once a day during their school education. Only 5 per cent used the Internet at least once a week (not every day), and the remaining 7 per cent had either no access to the Internet or used it less frequently (less than once a month or at least once a month, not every week). The increasing trend of Internet use demonstrated that nearly 95 per cent of respondents have access to the use of the Internet at least once a day currently, while only 2–3 per cent have a tendency to use it at least once a week.

FIGURE 3.35

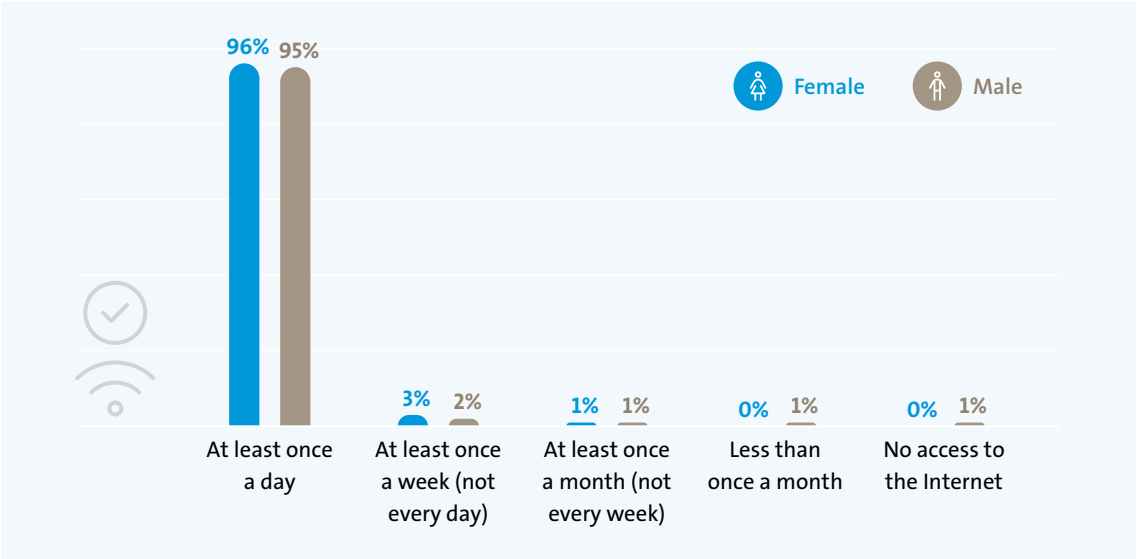
Frequency of use of the Internet (last year of school education), by gender



n = 190; Question 17.a – Please indicate the frequency of your use of the Internet during the last year of your school education (general secondary education).

FIGURE 3.36

Frequency of use of the Internet (as of now), by gender



n = 190; Question 17.b – Please indicate the frequency of your use of the Internet after enrolling in the education institution.

Survey respondents do not point out significant barriers in terms of access to ICT infrastructure. However, the increasing trend of Internet usage can also be observed between the last year of school education and the situation as of now. The frequency of computer use, mobile phone use and Internet access has increased; however, the increase in the frequency of use is not significant. There is still a difference when comparing the two genders, with an average 4 per cent difference among male and female respondents in current daily use of computers, mobile phones and the Internet.

The IDI respondents confirm that access to infrastructure is generally not the main cause of the lack of computer skills among the younger generation, more significantly in rural parts of Georgia. The more significant issue is related to the lack of qualified guidance on the effective use of computers and the Internet.

Survey respondents were also asked whether their access to a computer played a big role in their decision to choose their faculty or specialization at their university. It can be observed from the responses that around 53 per cent of female participants think that their access to a computer played a significant role in their decision-making, while 66 per cent of male participants responded the same.

The school students were asked during FGDs to assess the level of impact that their access to infrastructure has had on their decision to choose their future occupation. The majority of responses indicated that access to infrastructure plays a big role in students' future occupation. The majority of school students have ranked access to infrastructure as being of high importance and assume that this particular factor has a high level of impact on their choice regarding their future occupation. This further supports the importance of providing guidance on the use of computers and access to up-to-date information.

3.2.3 Skills and education

The desk research in combination with the key IDIs with the employers and employees demonstrates the importance of English language knowledge as it is essential for acquiring relevant experience and skills and furthering one's career development in the ICT sector.

Female survey participants are more proficient in English by the end of their school education and advance their knowledge during the higher education process at a higher rate than male respondents.

As demonstrated in Figure 3.37 and Figure 3.38 below, students were asked to perform a self-assessment and rank their knowledge of the English language on a scale from 1 (lowest proficiency) to 5 (highest proficiency) before and after joining the ICT educational field. Of the total number of respondents, 33 per cent indicated that they were proficient in English by the end of their school education (ranking their knowledge as a 4 or 5), and this indicator increased to 71 per cent after joining the educational facility.

Of the female students, 72 per cent indicated that they were proficient in English during their school education. As of now, 76 per cent of female participants responded to having a high level of proficiency in English, while 60 per cent of male students ranked their knowledge as highly proficient by the end of their school education years. However, the increasing trend demonstrates that as of today, nearly 64 per cent of male respondents have indicated their English knowledge as highly proficient. Fewer male participants ranked their English knowledge as highly proficient by the end of their school education; however, the increasing trend in their self-assessed level of knowledge is evident for both female and male participants.

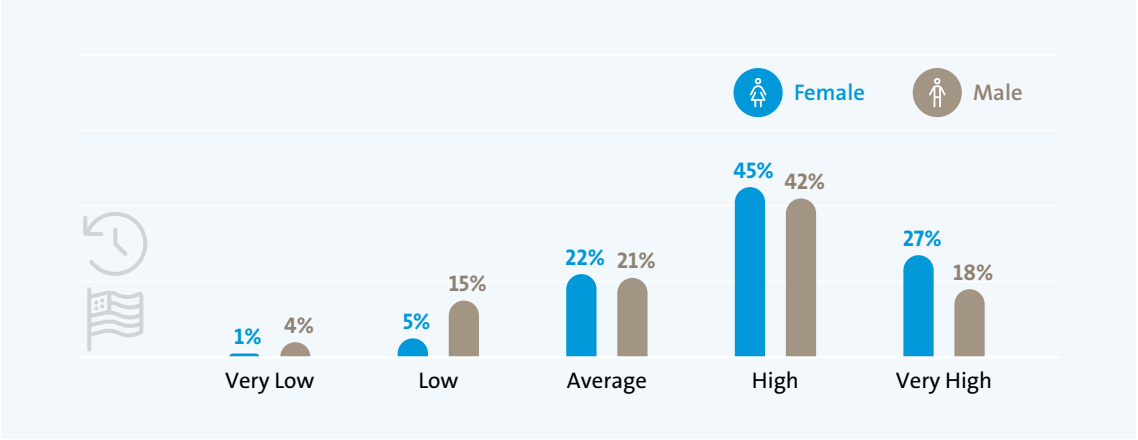
During the FGDs with school students, they were asked to assess the level of impact that knowledge of the English language has had on their decision to choose their future occupation. As identified, English language knowledge has a significant impact on school students' future occupation and has a high level of impact, even higher than their access to digital infrastructure.

As demonstrated by the IDIs with the university representatives, English language knowledge is one of the key parameters assessed for acceptance to education institutions; however, the passing scores vary among the universities. Thus, attention to the English language during students' school education is an important precondition to increase their access to the ICT educational field.

During the FGDs, university and VET college students also highlighted the importance of English language knowledge. Students who had higher proficiency in English had fewer barriers during their studies at university or a VET college. However, based on their experience, high proficiency in the English language is not fully sufficient for studying in ICT-related programmes. This particular field of study also requires good knowledge of specific industry and field-related terminology.

FIGURE 3.37

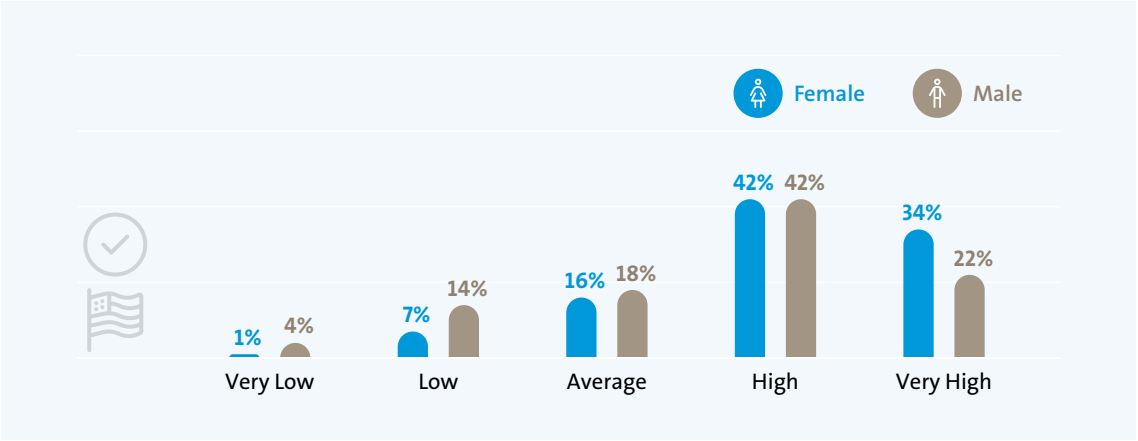
Knowledge of the English language (by the end of school education), by gender



n = 190; Question 19.a – Knowledge of the English language by the end of your school education (general secondary education).

FIGURE 3.38

Knowledge of the English language (as of now), by gender



n = 190; Question 19.b – Knowledge of the English language as of now.

Computer literacy and IT skills are equally essential for studying in ICT courses. The survey participants were asked to rank their computer literacy and IT skills—more specifically, their information, communication, problem-solving and software skills in the context of computer literacy—by the end of their school education and as of now. Computer literacy and IT skills include the following:

Information skills*	Copy/move files or folders; save files on Internet storage space; seek and obtain information from websites
Communication skills	Send/receive emails; participate in social networks; make telephone/ video calls over the Internet; upload self-created content to websites
Problem-solving skills	Transfer files between computer devices; install software and applications; change the settings of any software, including the operating system and security programs
Software skills	Use word processing software; use spreadsheet software; create presentations or documents integrating text/pictures/charts/tables; use advanced functions of spreadsheets to organize and analyse data, e.g. sort, filter, use formulas; write code in a programming language

*From top to bottom, the complexity of computer skills increases. Information and communication skills are easier to acquire; however, problem-solving skills and software skills are more complex by nature and harder to acquire.

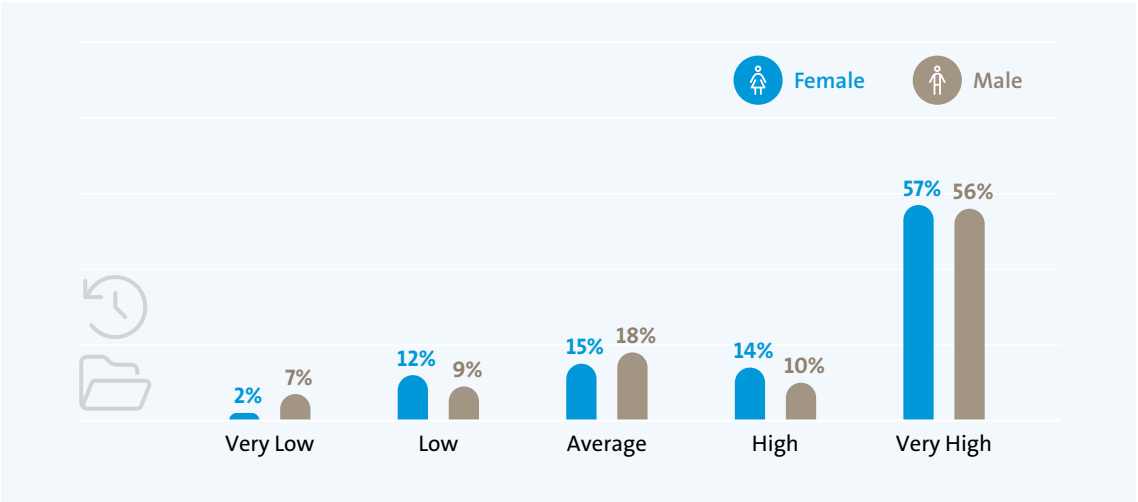
According to the survey participants' self-assessment of their computer skills, slightly more female survey participants had high proficiency in information and communication skills by the end of their school education and are advancing at a higher pace compared to the male respondents.

More than half of all respondents ranked their skills at the highest level of proficiency by the end of their school education (56 per cent). As of now, around 75 per cent of the respondents evaluate their information skills at the highest proficiency level. As it can be observed in Figure 3.39 and Figure 3.40, the respondents' proficiency is increasing in the same manner for female and male participants.

Of all the female respondents, 71 per cent ranked their level of knowledge as highly proficient (4 and 5) by the end of their school education, while as of now, the share equals 86 per cent (a 15 per cent increase). For male respondents, 66 per cent ranked their level knowledge as highly proficient by the end of their school education, with the proportion increasing significantly to 80 per cent as of now (a 14 per cent increase).

FIGURE 3.39

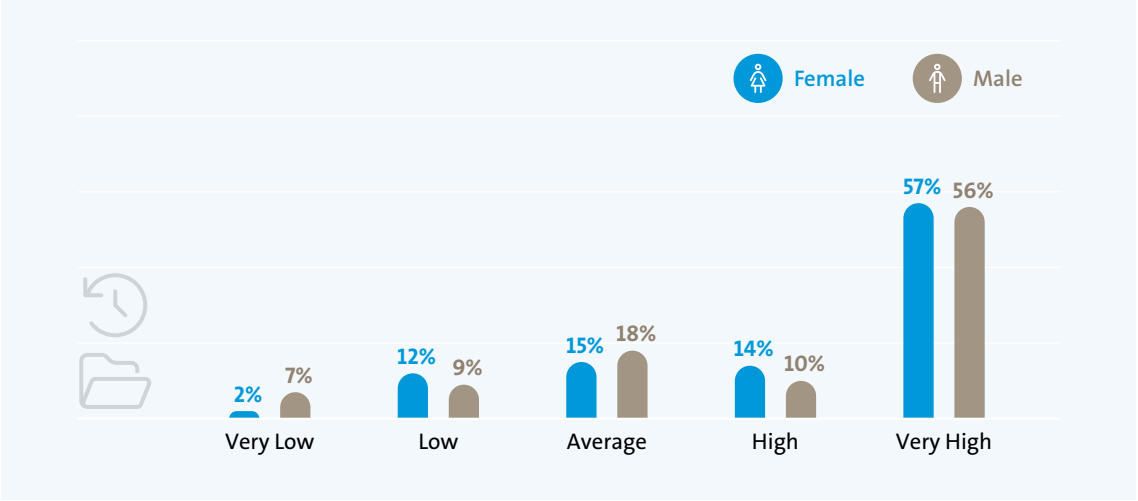
Computer literacy/IT skills – Information skills (by the end of school education), by gender



n = 190; Question 20.a – Computer literacy/IT skills by the end of your school education (general secondary education): Information skills.

FIGURE 3.40

Computer literacy/IT skills – Information skills (as of now), by gender

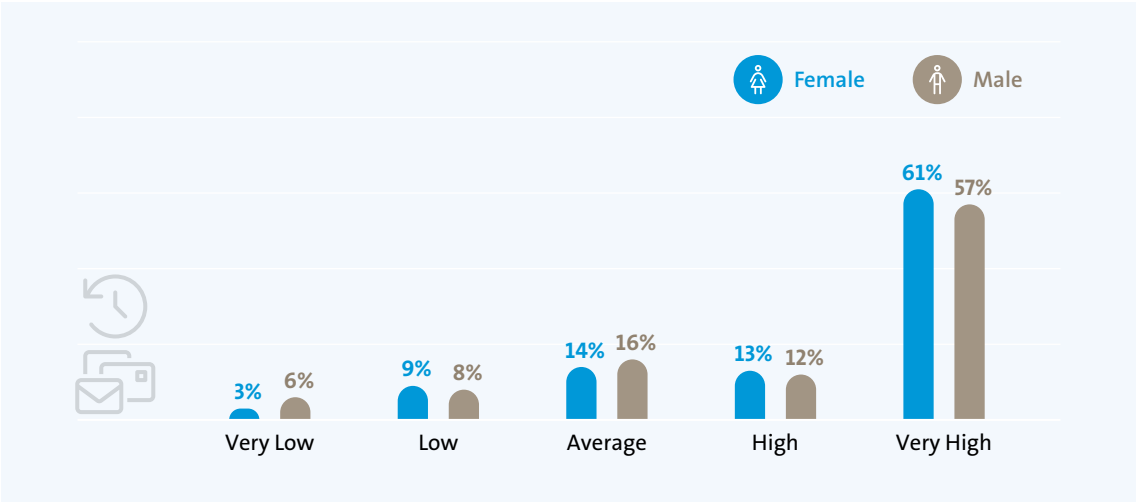


n = 190; Question 21.a – Computer literacy/IT skills as of now: Information skills.

As demonstrated in Figure 3.41 and Figure 3.42, 74 per cent of female respondents ranked their communication skills as highly proficient (4 and 5) by the end of their school education and increased their proficiency (by 13 per cent) after taking ICT courses, equalling to 87 per cent. In comparison, 69 per cent of male respondents ranked their knowledge as highly proficient; however, as of now, 80 per cent of male respondents have indicated their communication skills as highly proficient (an 11 per cent increase).

FIGURE 3.41

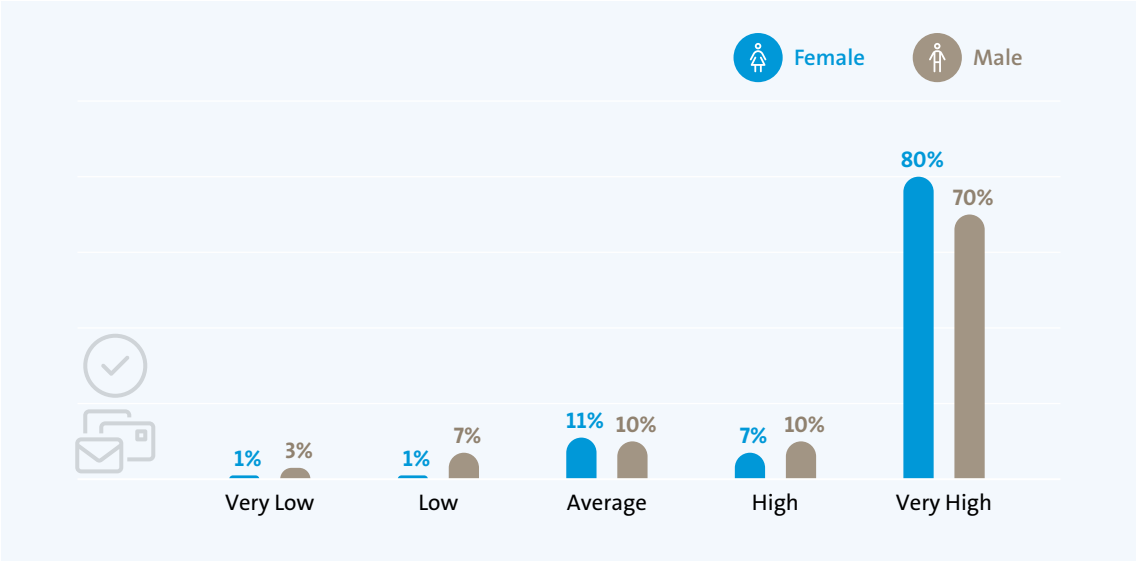
Computer literacy/IT skills – Communication skills (by the end of school education), by gender



n = 190; Question 20.b – Computer literacy/IT skills by the end of your school education (general secondary education): Communication skills.

FIGURE 3.42

Computer literacy/IT skills – Communication skills (as of now), by gender

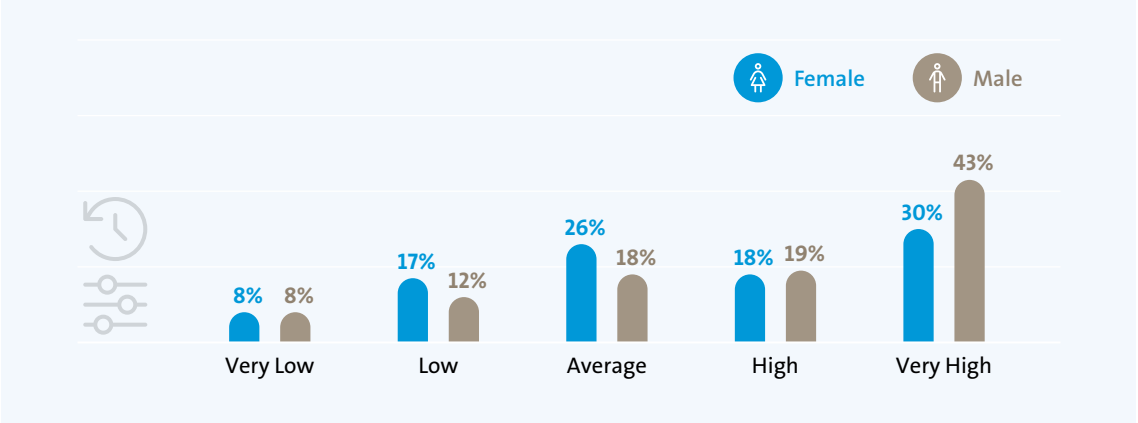


n = 190; Question 21.b – Computer literacy/IT skills as of now: Communication skills.

Female survey participants rate their end-of-school proficiency in problem-solving and software skills at a lower level than that of their male counterparts. However, females are advancing and acquiring more complex computer literacy skills far better than male participants after enrolment at university or a VET college.

FIGURE 3.43

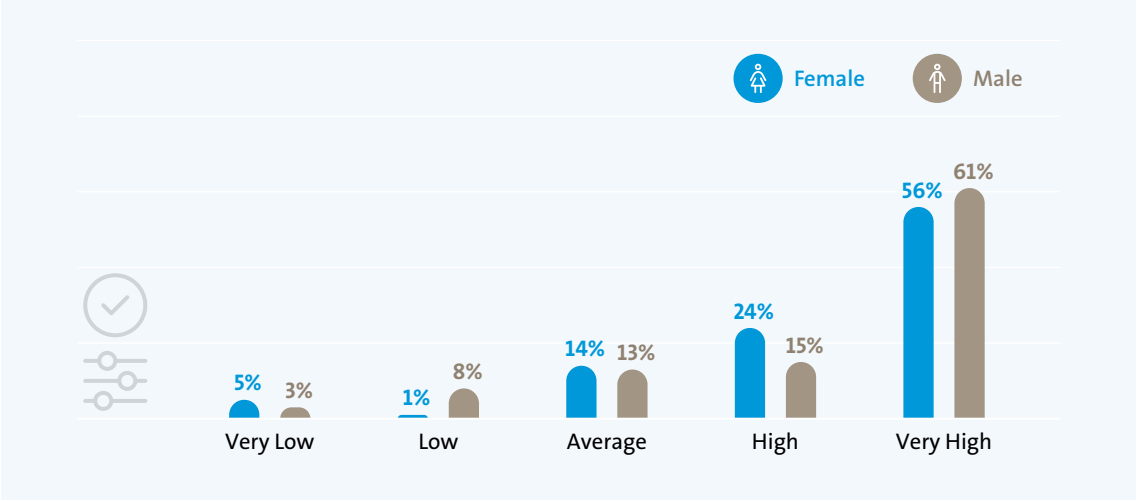
Computer literacy/IT skills – Problem-solving skills (by the end of school education), by gender



n = 190; Question 20.c – Computer literacy/IT skills by the end of your school education (general secondary education): Problem-solving skills.

FIGURE 3.44

Computer literacy/IT skills – Problem-solving skills (as of now), by gender



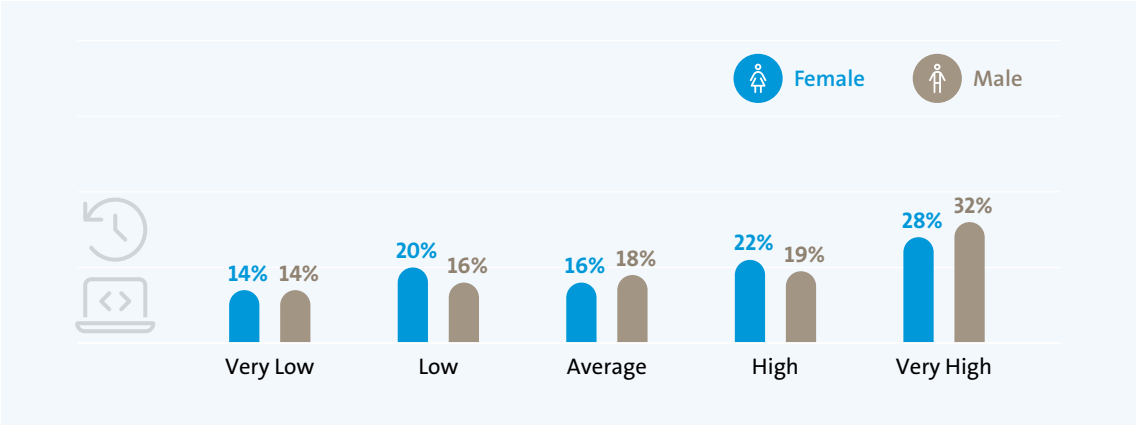
n = 190; Question 21.c – Computer literacy/IT skills as of now: Problem-solving skills.

According to the students' self-assessment of their problem-solving skills, less than half (48 per cent) of female respondents indicated their proficiency as high by the end of their school education, while 62 per cent of male respondents evaluated their skills as highly proficient (Figure 3.43). The increasing trend in their self-assessment of problem-solving skills proficiency can be clearly seen. As of now, 85 per cent of female students and 76 per cent of male students rank their proficiency as high; however, a significant increase (of 37 per cent) can be noted in female participant responses (and only a 14 per cent increase for male participants) (Figure 3.44).

As noted in Figure 3.45 and Figure 3.46 below, the same trend has been observed in the self-assessment of software skills ranking between female and male participants. By the end of their school education, 50 per cent of female students ranked their software skills as highly proficient, while 51 per cent of male participants did the same. As of now, a significant increase is noted in both genders, with 79 per cent of female students and 66 per cent of male students ranking their proficiency as high. For female students, this 29 per cent increase in their computer literacy/software skills is a significant increase in their perception of their skills after enrolment at university or a VET college.

FIGURE 3.45

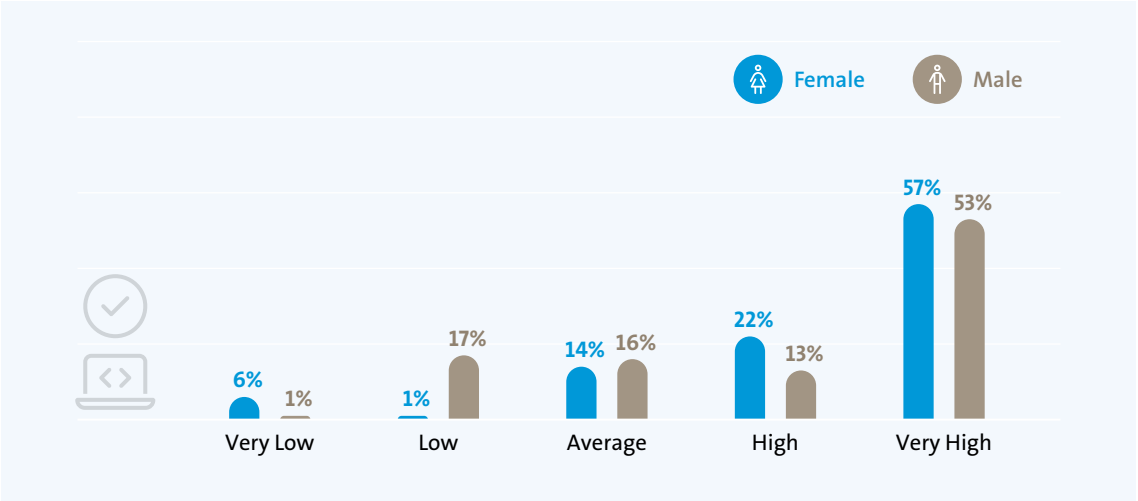
Computer literacy/IT skills – Software skills (by the end of school education), by gender



n = 190; Question 20.d – Computer literacy/IT skills by the end of your school education (general secondary education): Software skills.

FIGURE 3.46

Computer literacy/IT skills – Software skills (as of now), by gender



n = 190; Question 21.d – Computer literacy/IT skills as of now: Software skills.

According to the university representatives, students' level of computer literacy at the end of their school education significantly affects their ability to comprehend their study programme. Representatives also agree that there is some noticeable progress in terms of entry-level computer skills among students. According to the students' self-assessment of their computer literacy skills, it has been observed that students from urban and rural territories of Georgia do not differ significantly in terms of information, communication, problem-solving and software skills (i.e. computer literacy).

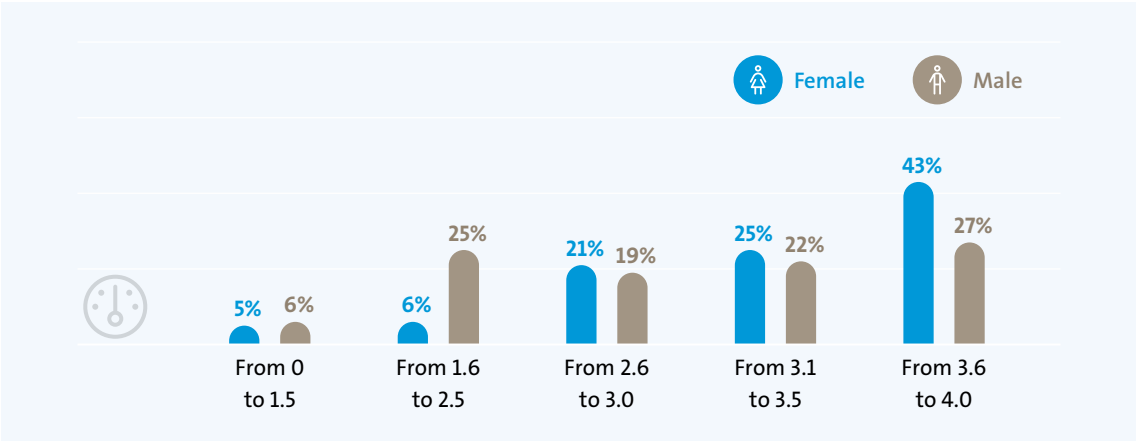
During the focus group discussions, university and VET college students highlighted that the students with higher proficiency in computer literacy during their school education years had fewer barriers during their studies at university or a VET college. Despite the fact that VET colleges provide ICT-related programmes that focus on basic computer literacy skills as well, students with lower computer literacy proficiency still face certain barriers during their studies at college.

A significantly higher share of female survey participants have better academic performance at the university level (bachelor's degree) than the male respondents.

To identify whether there are any differences between female and male participants in terms of performance scores at the university level, an analysis was conducted on the scores of students in higher education institutions (other than VET college students, since they do not have a performance scoring system). As it can be observed in Figure 3.47, a significantly higher share of female participants have better academic performance at university than male participants. Around 43 per cent of female participants have the highest range of GPA (from 3.6 to 4.0), while only 27 per cent of male participants have the same academic performance. Only 13 per cent of female students have a GPA from 0 to 2.5, while a significantly higher share of male students have the same GPA range (30 per cent). According to the academic performance statistics provided by several universities, male students have a GPA of around 2.5, while female students have better academic performance with an average GPA of 2.8.

FIGURE 3.47

Participants' GPA (grade point average), by gender



n = 121; Question 14 – If your education institution scores students by GPA (grade point average), please select your GPA range.

3.2.4 Career plans

The online survey participants were asked about their employment status, form of employment, employment preference and key motivational factors for choosing a job. Since the share of online survey respondents who are employed is relatively low, the results of the analysis highlight general tendencies of the factors that students consider related to employment in the ICT sector.

The level of employment varies among educational institutions; however, the share of employed students among bachelor's degree candidates gradually increases from the second year of education to the fourth year. According to IDIs with universities, ICT company representatives and employees, students employed in the ICT sector have comparably high wages, which in some cases results in a lack of attention towards the educational process. On the other hand, recruitment can start as early as the end of school education, and on-the-job trainings are offered to new recruits as well.

The majority of the FGD participants (university and VET college students) were unemployed. Female university and VET college students responded that the major barrier for them in terms of employment is the lack of employer confidence in their qualifications before finishing their studies.

General interest in the field and personal development are key motivational factors for female and male survey participants when choosing a job; however, female respondents are more motivated by a competitive salary and flexible working hours compared to the male respondents.

The heat map in Figure 3.48 ranks respondents' motivational factors for choosing a job. As it can be observed, the main three motivational factors for choosing a job for both genders are general interest in the ICT field, a competitive salary and personal development. According to the female participant responses, having a competitive salary (18 per cent) is a more important motivational factor for them than personal development (16 per cent), whereas for male students, personal development (18 per cent) seems to be a more important motivator than having a competitive salary (14 per cent). Differences in key motivational factors can be observed in the responses regarding the flexibility of working hours (e.g. for remote work): 11 per cent of female students responded that this is the fifth most important motivational factor, while male participants rank this factor as sixth most important (9 per cent of respondents). The data show that personal development is more important for male participants (19 per cent) than for female participants (17 per cent).

FIGURE 3.48

Key motivational factors for choosing a job

Key motivational factors for choosing a job	Total	Female	Male
General interest in this field	27%	25%	25%
Competitive salary	17%	18%	14%
Personal development	15%	16%	18%
Work environment	14%	14%	15%
Having the basic skills required for the job	11%	11%	10%
Flexibility of working hours; remote working options	9%	10%	8%
Employees working in the company/organization	3%	3%	3%
Company/organization reputation	2%	2%	3%
Location's proximity to mv place of residence	2%	0%	3%

n = 190; Question 26 – What are your top three key motivational factors for choosing a job?

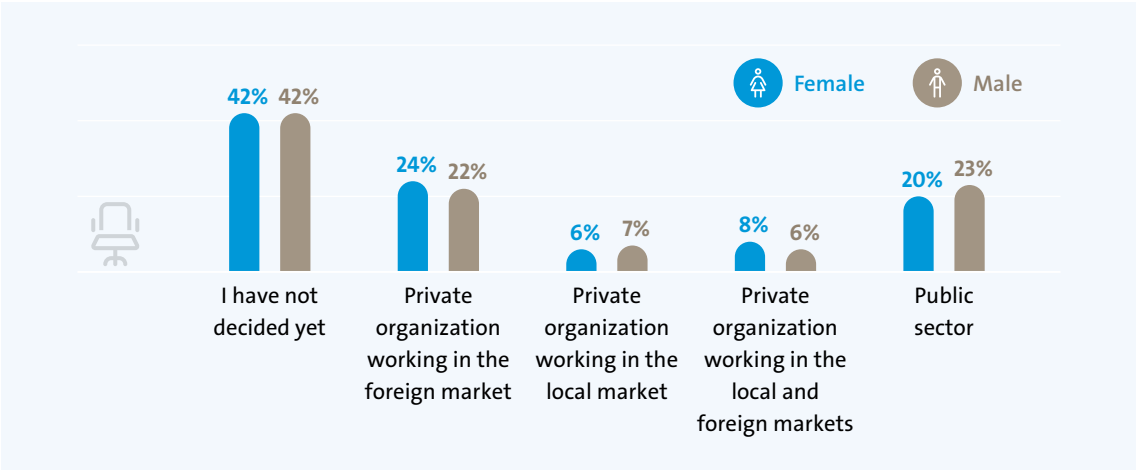
As a result of the FGDs with school students, it has been identified that equally important motivators for choosing a future employer are a competitive salary and comfort as well as the environment/surroundings and recommendations from others. During the FGDs with university and VET college students, it has been identified that the primary motivator is a competitive salary in this sector. Most of the participants were aware that the ICT sector provides various opportunities and competitive salaries based on their family members' and friends' professional experience.

The survey respondents were also asked about their employment preference (Figure 3.49). As it can be observed, the same share of female and male respondents prefer to work in a private organization working in local and foreign markets, while slightly more female participants are eager to work in a private organization working in the foreign market. The public sector is preferred by nearly the same share of female and male participants; however, slightly more female students prefer to work in a private organization working in the local market (8 per cent of female and 5 per cent of male participants). Around 20 per cent of both female and male students indicated that they have not decided yet.

Based on the FGDs with school students, the majority of participants are aware of their desired future profession; however, a significant portion of the students are not aware of their employment preference yet.

FIGURE 3.49

Employment preference, by gender



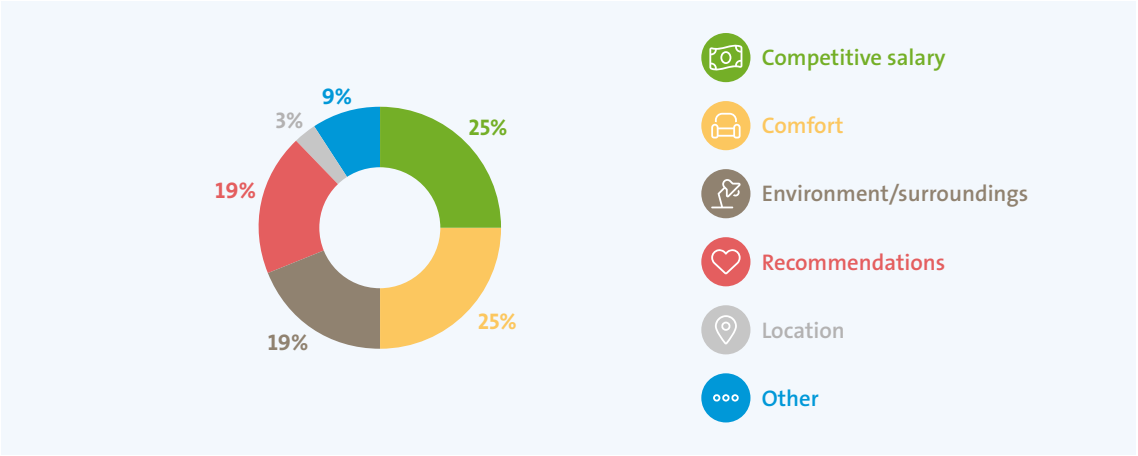
n = 190; Question 27 – Please indicate your employment preference.

The top four motivational factors for choosing a future employer are a competitive salary, comfort (including flexible working arrangements), the environment in the office and the recommendations of students' friends and relatives (Figure 3.50).

According to the IDIs with employers in the ICT sector, the limited availability of qualified candidates in this sector results in the considerable wage competition among companies. In order to attract and retain the best candidates, companies differentiate themselves based on work environment, culture, interesting projects and personal development opportunities. The nature of the job, in most cases, enables companies to offer distance work and flexible working hours to their employees, which employers believe is a higher priority for married female employees.

FIGURE 3.50

Key motivational factors for choosing a future employer



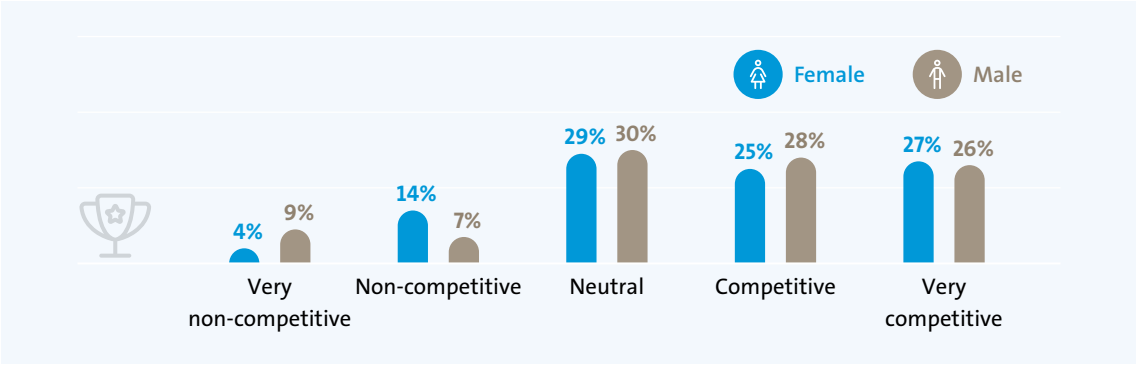
Note: This chart is based on the focus group analysis.

Slightly more male survey participants perceive themselves as competitive in the labour market compared to the female participants.

Figure 3.51 compares the perception of male and female survey respondents about their competitiveness in the labour market, ranking themselves from 1 (the least competitive) to 5 (the most competitive). Approximately half of the female participants (52 per cent) perceive themselves as competitive (4 and 5), while around 54 per cent of male respondents perceive themselves as competitive in the labour market.

FIGURE 3.51

Perception of one's own competitiveness in the labour market, by gender



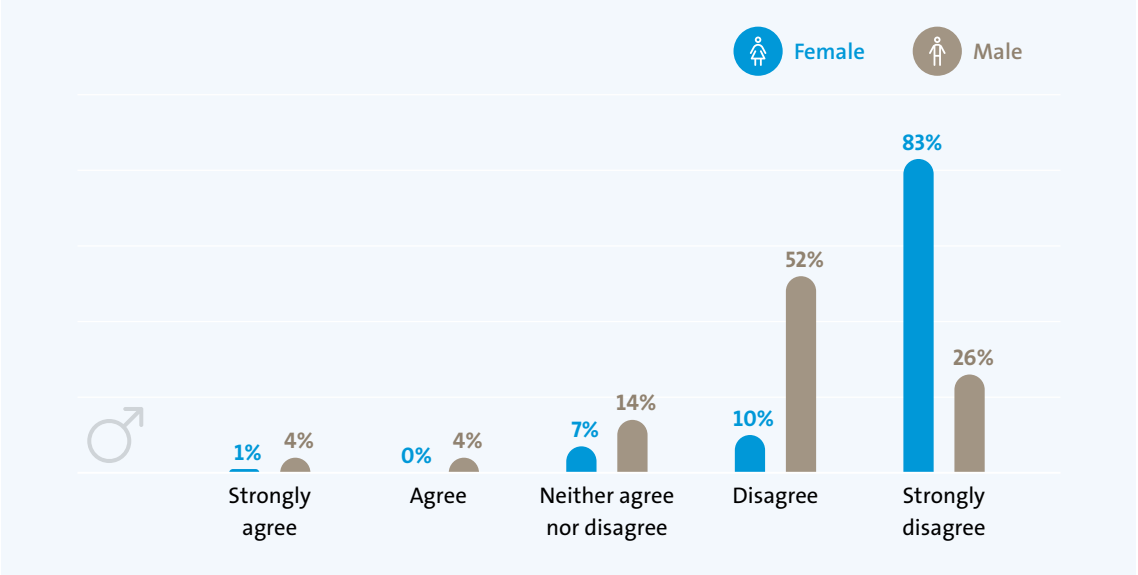
n = 190; Question 31 – Do you think you will be competitive in the labour market considering your skills and capacity? (Please select from 1 (not competitive) to 5 (very competitive))

More male than female participants perceive ICT as a man's profession.

Figure 3.52 compares the perception of respondents of both genders on their perception of ICT, a man's profession. It can be clearly observed that mostly female respondents disagree or strongly disagree with the statement. Around 93 per cent of female participants either disagree or strongly disagree, while 77

per cent of male respondents disagree or strongly disagree with the statement. At the same time, around 8 per cent of male respondents either agree with this statement or prefer not to provide their opinion (14 per cent). Only 1 per cent of female respondents either agree or strongly agree with the statement.

FIGURE 3.52
Perception of ICT as a man's profession, by gender



n = 161; Question 25 – To what extent do you agree with the following statement: "ICT is a man's profession since men are better at maths than women"?

3.2.5 Barriers and challenges

The online survey questionnaire assessed the barriers prior to students deciding on their field of education as well as the challenges during their education years in relevant fields and challenges on the way to ICT employment. The analysis on the barriers and challenges was performed considering the responses of the ICT students to these particular questions.

Those participants who responded that they were studying in another (non-ICT) field were asked the reason for not choosing ICT as their field of education.

More female participants did not choose ICT as their field of education at university or a VET college due to the unavailability of basic skills training required for this field.

As a result of the analysis of non-ICT students' responses (Figure 3.53), nearly one quarter of non-ICT students (26 per cent) responded that they had no interest in the ICT field and related subjects, while 24 per cent of respondents indicated that they did not have experience in the same field to choose ICT as their field of education (the same share of female and male students). For female participants, one of the main reasons for not choosing ICT as their field of education was the unavailability of basic skills training required for this field (18 per cent), while a lower percentage of male students responded the same (14 per cent). The absence of role models in this field was also an important factor while deciding their future field of education for both female and male participants.

During the FGDs, it was reiterated that female university and VET college students did not have role models in this field other than family members or relatives who are employed in the ICT sector.

Other reasons, such as territorial distance, tuition fees, discouragement from school teachers, unavailability of funding opportunities, pressure from parents/older peers/others or common stereotypes about the ICT profession's inappropriateness for girls/boys, were not significant factors for non-ICT students. Territorial distance between the educational institution and place of residence seemed to be a more important factor for male students (8 per cent of male and 4 per cent of female participants).

FIGURE 3.53

The reason for not choosing ICT as one's field of education

The reason for not choosing ICT as one's field of education	Total	Female	Male
No interest in the ICT field and related subjects	26%	27%	24%
No previous experience in the same field	24%	24%	24%
Unavailability of basic skills required for this field of study	17%	18%	14%
Absence of role models in this field	14%	14%	14%
Territorial distance between the educational institution and my place of residence	5%	4%	8%
Tuition fees	4%	4%	5%
My teachers at school discouraged me	3%	4%	3%
Unavailability of scholarships or funding opportunities	3%	2%	4%
Pressure from parents, older peers, others	2%	2%	1%
Common stereotypes about the inappropriateness of the ICT profession for girls/boys	1%	1%	3%

n = 190; Question 1.a – Please indicate the reason for not choosing ICT as your field of education. (Note: This question was only for those students who did not choose ICT as their field of education.)

The FGD participants (university and VET college students) also underlined that they have faced certain barriers at school related to the stereotypes on the inappropriateness of the ICT profession for girls. At the same time, the FGDs with school students identified that during the profession selection process, family and teachers play the most significant role as they are critical influencers for the students. The importance of various groups in the decision-making process is as follows (ranked from the most important to the least important):

- The family
- Teachers
- Friends
- Society
- School

As observed during the discussions with school students, they could not specify 'role models' as an influential group due to the absence of role models; accordingly, their choice of future education field is not based on this particular factor.

One of the main barriers faced by female survey participants prior to deciding on their field of education is common stereotypes regarding the inappropriateness of the ICT profession for them.

The heat map in Figure 3.54 incorporates all of the barriers and challenges that the study participants faced prior to deciding on their field of education. Some common barriers for both genders are (1) the unavailability of experienced and knowledgeable teachers at school in the field; (2) the lack of sufficient funds for tuition fee; and (3) common stereotypes about the appropriateness of the ICT profession for girls/boys. However, the barriers and challenges that the participants faced prior to deciding on an education field differs by gender. For female participants, the most common barrier or challenge was the unavailability of experienced and knowledgeable teachers at school as well as the prevalence of stereotypes about the inappropriateness of the ICT profession for girls/boys. For male participants, however, it was not common for them to face barriers or challenges due to stereotypes.

During the FGDs with university and VET college students, it has been identified that a major barrier for students prior to deciding on ICT as their field of education was the lack of experienced and qualified teachers at school in this field.

It can be observed that the unavailability of or limited access to IT infrastructure is not a common barrier that the majority of respondents face and that the responses do not differ by the gender of the participants.

It should also be noted that a significantly higher number of male participants (36 per cent) did not face any barrier or challenge compared to the female respondents (20 per cent).

FIGURE 3.54

Barriers and challenges prior to deciding on one's field of education, by gender

Barriers/challenges prior to deciding on one's field of education	Total	Female	Male
Unavailability of experienced and knowledgeable teachers at school in the field	22%	24%	18%
Lack of sufficient funds for tuition fees	13%	14%	11%
Common stereotypes about the inappropriateness of the ICT profession for girls/boys	9%	14%	4%
Transportation issues (distance between education institution and home	8%	5%	10%
Unavailability of or limited access to IT infrastructure (e.g. computer, the Internet, mobile phone)	6%	5%	6%
Accommodation issues	6%	5%	6%
Language barrier	4%	3%	4%
Teachers have questioned my capacity to study STEM subjects at school	3%	4%	3%
Parents/family did not support my choice of education field	2%	4%	1%
I did not face any barrier/ challenge	27%	20%	36%

n = 190; Question 22 – Please specify the main barriers/challenges you faced prior to deciding on your field of education (please select up to three).

During the FGDs with school students, it has been identified that school students from rural and urban parts of Georgia face different barriers and challenges.

As observed in Figure 3.55, the unavailability of or limited access to IT infrastructure as well as accommodation issues are important barriers for rural students, while a smaller share of students from urban parts of Georgia have indicated the same. It should also be highlighted that nearly one third of urban students did not face any barrier or challenge, while a significantly smaller share of students from rural areas responded the same.

FIGURE 3.55

Barriers and challenges prior to deciding on one's field of education, by place of residence

Barriers/challenges prior to deciding on one's field of education	Total	Urban	Rural
Unavailability of experienced and knowledgeable teachers at school in the field	22%	22%	21%
Lack of sufficient funds for tuition fees	13%	13%	12%
Common stereotypes about the inappropriateness of the ICT profession for girls/ boys	9%	9%	9%
Transportation issues (distance between education institution and home	8%	7%	10%
Unavailability of or limited access to IT infrastructure (e.g. computer, the Internet, mobile phone)	6%	4%	12%
Accommodation issues	6%	4%	12%
Language barrier	4%	4%	4%
Teachers have questioned my capacity to study STEM subjects at school	3%	3%	6%
Parents/family did not support my choice of education field	2%	3%	0%
I did not face any barrier/challenge	27%	31%	15%

n = 190; Question 22 – Please specify the main barriers/challenges you faced prior to deciding on your field of education (please select up to three).

The heat map in Figure 3.56 demonstrates the barriers and challenges survey participants have faced during their education years. The most common barriers for both female and male participants were the lack of sufficient previous experience in this field, difficulties related to working and studying in parallel, and the lack of sufficient funds for tuition fees. The lack of sufficient previous experience in this field was an important barrier for female participants (27 per cent of female participants and 15 per cent of male participants). The unavailability of and limited access to IT infrastructure was also a barrier for slightly more female participants.

Common stereotypes about the inappropriateness of the ICT profession for girls/boys is an important challenge for female participants (8 per cent of female and 2 per cent of male participants). However, transportation issues are an important barrier for more male participants (9 per cent).

FIGURE 3.56

Barriers and challenges during students' education years

Barriers/challenges during students' education years	Total	Female	Male
Lack of sufficient previous experience in this field	21%	27%	15%
Difficulties related to working and studying in parallel	11%	11%	12%
Lack of sufficient funds for tuition fees	9%	11%	7%
Unavailability of or limited access to IT infrastructure (e.g. computer, the Internet, mobile phone)	6%	7%	5%
Limited time for studying due to other duties (family obligations, e.g. housework, children	6%	5%	7%
Common stereotypes about the inappropriateness of the ICT profession for girls/boys	5%	8%	2%
Transportation issues (distance between education institution and home	5%	2%	9%
Accommodation issues	4%	5%	3%
Language barrier	3%	1%	5%
Lack of interest	2%	1%	4%
Scepticism about my proficiency in ICT due to my gender	1%	1%	1%
Teachers/professors question my capacity to study STEM subject	1%	2%	0%
I am not facing any barrier/challenge	26%	21%	30%

n = 190; Question 23 – Please specify barriers/challenges you are facing during your education years (please select up to three).

The heat maps in Figure 3.57 and Figure 3.58 presents all of the barriers and challenges that students have already faced on the way to employment in the ICT sector. It can be noted that nearly one quarter of the respondents have not tried employment in the ICT sector, yet another quarter did not face any barriers or challenges. Participants' responses demonstrate that they have faced difficulties related to (1) working and studying in parallel (18 per cent of female participants and 16 per cent of males); and (2) employers questioning their qualifications or knowledge. Based on the response analysis, slightly more female students' qualifications or knowledge was questioned by employers (15 per cent of female participants) than male participants' qualifications or knowledge (12 per cent).

More female students think that connections through acquaintances are essential for employment in this field (9 per cent of total female students versus 6 per cent of males). Moreover, as it can be seen from

the heat map, a significantly greater number of male participants did not face any barriers or challenges on the way to ICT employment than female participants. For 12 per cent of female and 6 per cent of male participants, education institutions did not provide them with sufficient knowledge for employment.

During the IDIs with the employers, it was identified that education institutions require significant time to develop and obtain approval for new courses. Accordingly, employers prioritize essential skills that students obtain at the educational institutions and focus on specific job-related skills as part of employee development programmes.

FIGURE 3.57

Barriers and challenges on the way to ICT employment, by gender

Barriers/challenges on the way to ICT employment	Total	Female	Male
Difficulties related to working and studying in parallel	18%	17%	17%
Employers have questioned my qualifications or knowledge	14%	15%	12%
The educational institution did not provide me with sufficient knowledge for employment	10%	12%	6%
It is necessary to have connections through acquaintances for employment in this field	8%	9%	6%
Gender discriminatory practices from employers	3%	4%	2%
Language barrier	0%	0%	1%
I have not tried pursuing employment in the ICT sector yet	24%	27%	24%
I have not faced any barrier/challenge	24%	16%	31%

n = 190; Question 24 – Please specify the barriers/challenges you have faced on the way to ICT employment (please select up to three).

FIGURE 3.58

Barriers and challenges on the way to ICT employment, by place of residence

Barriers/challenges on the way to ICT employment	Total	Urban	Rural
Difficulties related to working and studying in parallel	18%	18%	20%
Employers have questioned my qualifications or knowledge	14%	15%	10%
The educational institution did not provide me with sufficient knowledge for employment	10%	12%	2%
It is necessary to have connections through acquaintances for employment in this field	8%	7%	12%
Gender discriminatory practices from employers	3%	3%	0%
Language barrier	0%	0%	0%
I have not tried pursuing employment in the ICT sector yet	24%	21%	36%
I have not faced any barrier/challenge	24%	24%	20%

n = 190; Question 24 – Please specify the barriers/challenges you have faced on the way to ICT employment (please select up to three).

4

SUMMARY OF KEY FINDINGS

The following findings were compiled after triangulating the results across both secondary and primary data analyses. With reference to the overall purpose of the study, the findings are detailed under the areas of access to ICT, ICT education and career plans.

4.1 ACCESS TO ICT

- Georgia's indicators related to the access to ICT infrastructure (access to computer use, mobile phone use, use of the Internet) are generally above the world average. However, there are considerable access differences among the population living in urban and rural areas of the country. In general, access to mobile Internet is higher than fixed broadband Internet.
- Digital infrastructure access is not a significant barrier for ICT students who participated in the online survey. The trend is quite similar for both female and male participants of the study. In general, a slightly smaller share of female participants had access to various ICT infrastructure by the end of their school education in comparison with male participants; however, female survey participants' access increased after they began their formal ICT education. Since joining the ICT educational field, either similar or slightly more female participants have daily access to ICT infrastructure compared to male participants.
- The share of the population who uses digital infrastructure is growing, with limited access remaining a concern for the population in rural areas.
- The quality and price of the Internet is the largest barrier for the population to increasing their Internet use.
- The unavailability of statistics around the purpose of computer use does not allow for an in-depth gender-lens analysis related to the access to digital infrastructure.

4.2 ICT EDUCATION IN GEORGIA

- Despite the growth of the number of ICT students in bachelor's and VET programmes, the gender balance of admissions to and students in ICT programmes remains strongly male dominated, with female students representing only around 14 per cent of bachelor's programme students and 29 per cent of VET programme students.
- The main barriers that both male and female respondents of the online survey have faced prior to deciding on their field of education are:
  - The unavailability of experienced and knowledgeable teachers at school
  - The lack of sufficient funds for tuition fees
  - Common stereotypes about the appropriateness of the ICT profession for girls

  It is noteworthy that the majority of male participants of the online survey stated that they have not faced any barriers while choosing their profession.

- One of the key barriers to women's engagement in the ICT sector, especially at the education level, is related to prevailing stereotypes in society. Since family participation in a student's choice of profession is significant, their perception of ICT as a man's profession restrains girls from making a free selection. The majority of the female respondents either disagree or strongly disagree with the statement that "ICT is a man's profession", while significantly fewer male participants disagree with the statement (90 per cent of female participants and 75 per cent of male participants disagree or strongly disagree with the statement). The absence of female role models in the sector also negatively affects the popularity of ICT programmes.
- There is a lack of awareness among the younger generation about the ICT profession and its benefits (e.g. earning high wages, gaining skills in high demand in export markets, working abroad, having more work flexibility). At the same time, those in the younger generation who are aware of these opportunities do not know about the stability of the profession in the mid to long term.
- Despite the fact that a lower number of female students are studying in ICT programmes, a higher share of female participants has better academic performance at university than male participants.
- It is difficult for the education institutions to attract qualified teachers and professors to their programmes as these institutions are competing with ICT companies, which pay significantly higher wages.
- It is also difficult for education institutions to regularly update their curriculum in line with the fast pace of changes in the sector, thus putting higher pressure on companies to implement in-house upskilling programmes.
- In order to reduce the workforce supply gap in the ICT sector, some of the organizations hire school graduates. However, formal education remains important since it enables the creation of higher value-added services.

4.3 CAREER PLANS

- There is growing demand for ICT professionals in the sector as suggested by the IDIs; however, to further understand the real growth statistics, more granular subsectoral reporting of employment statistics is important.
- Increased demand in the ICT sector leads to high competition for skilled ICT professionals and drives up wages in the sector.
- Higher female engagement is important not only in terms of women's empowerment but also to fill the employment gap and support economic development.
- One of the main barriers that survey participants have faced on the way to ICT employment is employers questioning their qualifications and knowledge. Slightly more female students' qualifications or knowledge was questioned by employers than male participants' (14 per cent of females and 12 per cent of males).
- More female respondents think that connections through acquaintances are essential for employment in the ICT sector and perceive the lack of such connections as a barrier (10 per cent of female and 6 per cent of male respondents).
- The two main motivational factors for choosing a job for both genders are their general interest in the ICT sector and their personal development. In addition, female survey respondents emphasize the flexibility of working hours and/or the possibility of remote work as important motivational factors.
- Fewer female students than male students consider themselves to be competitive in the labour market, which might be due to the lack of self-confidence among female students.
- During the IDIs, it was identified that there were no initiatives facilitated by ICT companies and targeted towards increasing the participation of women in the sector.

ACTION-ORIENTED RECOMMENDATIONS FOR KEY ACTORS IN ICT

The following recommendations have been drafted across three levels, namely community, institutional and policy levels of action and intervention, with reference to the key findings drawn from the primary and secondary data. Across the policy level, macro-level recommendations have been drawn based on the findings presented from both the secondary and primary data analyses. At the institutional level, macro-level recommendations have been presented that are connected to the nature of the recommendations mentioned at both the community level and the policy level. At the community level, recommendations that are focused on awareness-raising and positive messaging at the family level have been included.

5.1 COMMUNITY LEVEL

Respondents state that the role of the Government in terms of both increasing awareness at the primary education level and working on issues around stereotypes is significant.

- **Combat stereotypes** – Overcome prevailing stereotypes regarding ICT as a man's profession:
  - Involve female role models in work with school students. Produce and promote successful cases.
  - Work with family members to promote increased community-level awareness on the appropriateness of the ICT profession for girls and women and to reduce gender discrimination and negative stereotypes on this topic.
- **Raise awareness about the ICT sector** – Raise awareness by increasing community-based media messaging and efforts to promote ICT as a profession of the future:
  - A growing market
  - In-demand professions
  - High or above-average wages
  - Flexible working arrangements
  - Remote employment opportunities outside Georgia

5.2 INSTITUTIONAL LEVEL

5.2.1 Educational institutions

Combat stereotypes – Work with teachers at the general education level to raise their awareness in the direction of gender equality, with a special focus on reducing the stereotypes regarding the inclusion of females in technical professions and paying special attention to the recruitment of new teachers in schools:

- Conduct training, workshops and capacity-building activities in schools for teachers (including new hires) explaining gender equality as well as the benefits and necessity of involving more women in the ICT sector. The Teachers Professional Development Center (TPDC) can play a vital role in this process.
- Raise awareness about women and girls' role models in the ICT sector and, at the same time, tackle the concerns regarding self-confidence by having schools prioritize engaging more women/girls in ICT school Olympiads, either through targeted campaigns or by introducing quotas for female students.

  High-scoring female students in Olympiads can act as role models among their fellow students. Successful students at schools, universities and VET colleges who are interested can act as role models to increase awareness about women's engagement in the ICT sector.

Enhance skills – Support students at the general education level, especially in rural areas, to obtain higher-quality skills:

- Support measures to promote the increased availability of technical resources including experienced and knowledgeable teachers and academic faculties across all levels (school, college and university).

  Support the availability of an increased number of skilled academics and faculties across the ICT educational institutions, including women ICT educators and professors.
- Consider giving higher education students the opportunity to choose paid internships as an alternative to writing a thesis but with an equal amount of ECTs.[1] These internships can be undertaken in general education schools, where university students will be able to deliver ICT lessons to school students.

  Additional short courses in pedagogy might be needed for the university students in order to train them on how to teach.
- Promote measures to support opportunities that enhance access to services that enable students irrespective of gender to have a high level of proficiency in STEM subjects, the English language and computer skills.

  Support scholarship opportunities that enhance access to technical resources and opportunities that help build proficiency in the English language and computer skills.
- Ensure access to computer infrastructure at schools, outside of scheduled classes, to enable students to practice and further improve their skills.

- With the support of developmental organizations, offer summer tech camps to provide opportunities to school students to test their abilities in ICT skills and learn new skills. Such opportunities can generate interest towards ICT professions and increase students' self-confidence in their ICT skills.

- **Increase awareness about ICT professions** – Inform school students about available career opportunities, including ICT professions:

  - Add ICT opportunities to the existing career counselling services at the general education level. In order to ensure programme efficiency, at the initial stages of the implementation, this might be done using an online platform, through which each counsellor will be able to cover several schools and regions at the same time.

    This will give school students the chance to explore future career opportunities and receive targeted guidance while they are choosing their future profession, including in the ICT sector.

  - Support opportunities for mentorship programmes to increase the availability of role models for girls to thrive and pursue technical education and employment in the ICT sector.

    Promote opportunities for mentorship programmes for girls and women in school and in higher education institutions to enable greater access, familiarity and awareness on ICT educational opportunities.

  - To reduce the budgetary influence imposed by family members on girls when choosing their future profession, ensure that donor organizations and/or the Government consider offering financial incentives and scholarships for girls choosing ICT as their educational programme.

    Involve various international development partners and international financial institutions in the process who have gender equality and social inclusion high in their priorities. UN Women and the Government of Georgia should work jointly to leverage their learning and the evidence to design the inclusive programmes.

5.2.2 ICT companies

- **Support women's professional development** – To further support women's increased engagement in the ICT sector, private sector companies can play an important role by promoting women role models, providing on-the-job development support to their women employees and ensuring that their policies provide a safe and inclusive working environment for women:

  - Support opportunities for mentorship programmes for female employees to increase their self-confidence and prepare them for leadership positions.

  - Promote successful female employees as role models to the wider public. It is important that more women are given a chance to promote their skills and success stories. In this regard, international development partners can play an important role by developing a platform for sharing stories about success cases. The platform can also be used by women to promote their skills and proactively seek employment opportunities.

- Provide training opportunities to company leadership and women employees targeted at ensuring an equal and inclusive working environment:
  - Attraction and retention of female employees for company management
  - Self-confidence and leadership skills trainings for female employees
- Have development agencies and the Government support ICT companies in revising company policies targeted at ensuring an equal and inclusive working environment:
  - Recruitment
  - Promotion
  - Training
  - Incentives
  - Family and/or childcare
  - Parental leave
  - Policies against sexual harassment and other forms of discrimination
- **Support life-long learning opportunities** – To ensure the life-long learning opportunities of employees, it is important that companies continue on-the-job training practices. However, it is also important to support employees who are currently studying in ICT programmes by offering flexible work arrangements.
- **Work with educational institutions** – To match the supply of ICT professionals from the educational institutions with the demand of the ICT companies, it is important to ensure a formalized and continuous dialogue between the parties. Awareness about the in-demand professions and skills from universities, backed by data from the private sector, will also support school students as they choose their future profession.
- **Collect gender statistics** – The collection and analysis of data with a gender lens will enable ICT companies to make informed decisions and tackle the wage gap issue. Key parameters that are important to be analysed include the following:
  - Number of candidates by different professions
  - Employment statistics by different professions
  - Wages by professions and levels
  - Statistics on job promotions
  - Statistics on resignations and the common reasons for resigning

5.3 POLICY LEVEL

- **Manage the implementation of planned initiatives** – It is vital that policy-level decisions are made by the Government and supported by the Gender Equality Council of the Parliament to support women's increased participation in the ICT sector. The first step is the preparation of an action plan that will ensure the implementation of the recommendations targeted at reducing barriers for women in the ICT sector. Once the action plan is prepared, the Government needs to assign oversight responsibilities to the agency that will monitor and report on the implementation of the action plan. Recommendations that are covered by this study and require government oversight include the following areas:
  - Combat stereotypes related to the perception of ICT as a man's profession
  - Raise awareness at the community level about the ICT profession
  - Plan infrastructure developments to increase access to infrastructure
  - Work with respective ministries and state agencies to improve the skills of educational personnel at public schools and to revise the school curriculum in order to ensure school students' acquisition of basic skills important for their future professions (including ICT skills)
  - Ensure the collection of gender-disaggregated statistics

- **Further improve access to infrastructure** – Considering the fact that more professionals now have the ability to work remotely, it is important to provide the females in rural areas with quality Internet and computer access. Access to quality Internet and computers has emerged as one of the barriers faced by women in rural areas. To address this barrier, the Government needs to prioritize improved access to such infrastructure:
  - Facilitate infrastructure projects that will enable the population in rural areas to have access to high-quality Internet.
  - To reduce the barrier related to the limited accessibility of the Internet and computers due to high prices, especially in the regions of Georgia, ensure that the Government consider establishing community/tech centres equipped with the required infrastructure. It is important that women in all rural areas are given equal opportunities to increase their access to ICT infrastructure. In this regard, the monitoring and coordination of various initiatives is important to ensure equitable access.

    Technoparks established by GITA in several regions of Georgia are a good example of accessible infrastructure that can be further replicated in other regions of Georgia.

- **Support women's participation in the ICT sector in public organizations** – Government organizations should change the job requirement of 'having at least a bachelor's degree' to 'having at least a VET degree (of proficiency level 4 or 5)' for ICT job vacancies. This measure will give the ICT VET graduates (including women) the chance to get employed in state organizations. In addition, it will increase the interest in VET ICT programmes.

Collect gender-disaggregated data – The limitations in data availability are a barrier to more in-depth gender-lens analyses. It is thus important to facilitate the collection and reporting of gender-disaggregated data in several areas:

Access to infrastructure

- Differentiation of household and individual access/use of the Internet and computer access, sex-disaggregated
- Computer access in rural areas, sex-disaggregated
- Internet access in rural areas, sex-disaggregated
- Mobile phone ownership and usage in rural areas, sex-disaggregated
- Self-reported attitudes and self-efficacy measures regarding ICT use for learning and leisure

Education

- Alignment of data collection in 'computing programmes' to the definition of 'ICT programmes'
- Number of dropouts from ICT programmes, sex-disaggregated
- Number of transfers from ICT to other programmes, sex-disaggregated
- Proportion of ICT-qualified teachers in schools by location, sex-disaggregated

Employment

- Sex-disaggregated employment statistics in the ICT sector by subsector: (1) publishing activities; (2) motion picture, video and television programme production, sound recording and music publishing activities; (3) programming and broadcasting activities; (4) telecommunications; (5) computer programming, consultancy and related activities; and (6) information service activities
- Employment statistics in the ICT sector by occupation, sex-disaggregated
- Employment statistics in the ICT sector by job function, sex-disaggregated
- Employment statistics in the ICT sector in management functions, at the board level and/or regarding ownership, sex-disaggregated
- Average monthly nominal earnings in the ICT sector by job function, sex-disaggregated

ANNEXES

Annex A – Online survey questionnaire

Section 1: Profile of the respondent

1. Are you studying in the field of ICT?

✓ Yes ✗ No

1.a. Please indicate the reason for not choosing ICT as your field of education:

- No interest in the ICT field and related subjects
- Unavailability of basic skills required for this field of study
- No previous experience in the same field
- Common stereotypes about the inappropriateness of the ICT profession for girls/boys
- Unavailability of scholarships or funding opportunities
- My teachers at school discouraged me
- Pressure from parents, older peers, others
- Territorial distance between the educational institution and my place of residence
- Tuition fees
- Absence of role models in this field

* The survey ends here if the respondent indicates that he/she does not study in the field of ICT.

2. Please indicate your gender:

♀ Female ♂ Male » Other

3. Please indicate your family status:

Single Married ⇄ Separated/ divorced Widowed

4. Please indicate your age: ____

5. Please indicate your employment status and sector:

- I am employed in the ICT sector
- I am employed in another sector (other than ICT)
- I am not employed

6. Which corresponds to your current form of employment?

- Full-time employment
- Part-time employment
- Paid internship
- Unpaid internship

7. Please indicate your monthly average income:

- GEL 0–1,000
- GEL 1,001–2,000
- GEL 2001–3,000
- GEL 3,001–4,000
- GEL 4,001 or above
- I prefer not to disclose

8. Please select the education institution you are studying at:

- Ivane Javakhishvili Tbilisi State University
- Ilia State University
- Batumi Shota Rustaveli State University
- Agricultural University of Georgia
- Iakob Gogebashvili Telavi State University
- Georgian Technical University
- Free University of Tbilisi
- The University of Georgia
- Caucasus University
- International Black Sea University
- Georgian American University
- David Aghmashenebeli University of Georgia
- New Vision University
- Business and Technology University
- Kutaisi International University
- Gori State University
- San Diego State University
- European University
- Community College "Information Technology Academy"
- Community College "Mermisi"
- Community College "Spektri"
- Vocational College "Black Sea"
- Vocational College "Modusi"

9. Please select your current degree/qualification level:

- Vocational education and training qualification
- Bachelor's degree
- Master's degree
- Doctorate degree

10. Please select your faculty/specialization:

- Computer science
- Information systems
- Information technologies
- Computer engineering
- Software engineering
- Telecommunications
- Engineering
- Joint cybersecurity programme
- Business and information technologies
- Information systems management
- Information technologies and systems in business

- Informatics
- Mathematics and computer science
- Electrical and computer engineering
- Data science and information technologies
- Digital telecommunication technologies
- Information technology in nuclear engineering
- Management of information technology
- Blockchain and distributed information systems
- Information technology support
- Web technology
- Computer networks and systems
- Computer network administration
- Other (please specify)

11. Which type of school did you attend?

- Public school
- Private school

12. Please indicate where you lived during your school years (i.e. where you spent most of your general secondary education years):

- Tbilisi
- City other than Tbilisi
- Rural area

13. What was your main motivation for selecting the indicated faculty/specialization? (Please select up to three)

- General interest in this field and related subjects
- Having the basic skills required for this field of study
- Continuing studies in the same field
- Competitive salary in the labour market
- Expected high demand of the profession in the future
- Scholarship/funding opportunities
- Personal development
- Requirement at current job; career advancement opportunities
- Flexibility of working hours; remote working option
- My parents, older peers or others advised or encouraged me
- My teachers at school advised or encouraged me
- High rankings of the education institution
- Affordable tuition fees
- Location's proximity to my place of residence
- Education institution's advertising campaign
- Influence of my role model
- Career opportunities abroad

14. If your education institution scores students by GPA (grade point average), please select your GPA range. Alternatively, provide your performance score or grade used by your education institution.

- From 0 to 1.5
- From 1.6 to 2.5
- From 2.6 to 3.0
- From 3.1 to 3.5
- From 3.6 to 4.0

Section 2: Access to ICT (information and communications and technology) infrastructure

15. Please indicate the frequency of your access to computer use:

a) During the last year of your school education (general secondary education)

- At least once a day
- At least once a week (not every day)
- At least once a month (not every week)
- Less than once a month
- No access to a computer

b) After enrolling in the education institution

- At least once a day
- At least once a week (not every day)
- At least once a month (not every week)
- Less than once a month
- No access to a computer

16. Please indicate the frequency of your access to mobile phone use:

a) During the last year of your school education (general secondary education)

- At least once a day
- At least once a week (not every day)
- At least once a month (not every week)
- Less than once a month
- No access to a mobile phone

b) After enrolling in the education institution

- At least once a day
- At least once a week (not every day)
- At least once a month (not every week)
- Less than once a month
- No access to a mobile phone

17. Please indicate the frequency of your use of the Internet:

a) During the last year of your school education (general secondary education)

- At least once a day
- At least once a week (not every day)
- At least once a month (not every week)
- Less than once a month
- No access to the Internet

b) After enrolling in the education institution

- At least once a day
- At least once a week (not every day)
- At least once a month (not every week)
- Less than once a month
- No access to the Internet

18. Did your access or limited access to a computer play a big role in your decision to choose your faculty/specialization at university? (Please select from 1 (no role) to 5 (big role))

Section 3: Skills and education

Please rate your skills from 1 (lowest proficiency) to 5 (highest proficiency) for the following questions:

19. Knowledge of the English language:

a) By the end of your school education (general secondary education)

b) As of now

20. Computer literacy/IT skills by the end of your school education (general secondary education):

a) Information skills (copying/moving/saving files or folders; searching for information on websites)

b) Communication skills (sending/receiving emails; participating in social networks; making calls over the Internet; uploading materials to websites)

c) Problem-solving skills (transferring files between computer devices; installing software and applications; changing settings of any software, including the operating system and security programs)

d) Software skills (using Microsoft Office and/or similar programs; creating presentations or documents; using advanced functions of spreadsheets (and/or Excel) for data analysis; writing code in a programming language)

21. Computer literacy/IT skills as of now:

a) Information skills (copying/moving/saving files or folders; searching for information on websites)

b) Communication skills (sending/receiving emails; participating in social networks; making calls over the Internet; uploading materials to websites)

c) Problem-solving skills (transferring files between computer devices; installing software and applications; changing settings of any software, including the operating system and security programs)

d) Software skills (using Microsoft Office and/or similar programs; creating presentations or documents; using advanced functions of spreadsheets (and/or Excel) for data analysis; writing code in a programming language)

Section 4: Barriers and challenges

22. Please specify the main barriers/challenges you faced prior to deciding on your field of education (please select up to three):

- Unavailability of or limited access to IT infrastructure (e.g. computer, the Internet, mobile phone)
- Unavailability of experienced and knowledgeable teachers at school in the field
- Lack of sufficient funds for tuition fees
- Common stereotypes about the inappropriateness of the ICT profession for girls/boys
- Parents/family did not support my choice of education field
- Teachers have questioned my capacity to study STEM subjects at school
- Accommodation issues
- Transportation issues (distance between education institution and home)
- Language barrier
- I did not face any barrier/challenge

23. Please specify the barriers/challenges you are facing during your education years (please select up to three):

- Unavailability of or limited access to IT infrastructure (e.g. computer, the Internet, mobile phone)
- Lack of sufficient funds for tuition fees
- Lack of sufficient previous experience in this field
- Common stereotypes about the inappropriateness of the ICT profession for girls/boys
- Teachers/professors question my capacity to study STEM subjects
- Limited time for studying due to other duties (family obligations, e.g. housework, children)
- Scepticism about my proficiency in ICT due to my gender
- Difficulties related to working and studying in parallel
- Language barrier
- Parents/family do not support my choice of education field
- Accommodation issues
- Transportation issues (distance between education institution and home)
- Teachers' perception of my gender
- Lack of interest
- I am not facing any barrier/challenge

24. Please specify the barriers/challenges you have faced on the way to ICT employment (please select up to three):

- Employers have questioned my qualifications or knowledge
- The educational institution did not provide me with sufficient knowledge for employment
- Gender discriminatory practices from employers
- Language barrier
- It is necessary to have connections through acquaintances for employment in this field
- Difficulties related to working and studying in parallel
- I have not tried pursuing employment in the ICT sector yet
- I have not faced any barrier/challenge

25. To what extent do you agree with the following statement: "ICT is a man's profession since men are better at maths than women"?

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Section 5: Employment and career plans

26. What are your top three key motivational factors for choosing a job?

- General interest in this field
- Having the basic skills required for the job
- Competitive salary
- Personal development
- Flexibility of working hours; remote working option
- Location's proximity to my place of residence
- Company/organization reputation
- Work environment
- Employees working in the company/ organization

27. Please indicate your employment preference:

- Private organization working in the local market
- Private organization working in the foreign market
- Private organization working in local and foreign markets
- Public sector
- I have not decided yet

28. Please select your preferred profession (please select up to three):

- Data analyst
- Data scientist
- Data centre technician
- Hardware engineer
- IT consultant
- IT manager
- Multimedia developer
- Business analyst
- Cybersecurity specialist
- Programmer
- Web designer
- Software developer
- Software analyst
- Network administrator
- Network engineer
- Systems engineer
- Tech support
- Telecommunications engineering specialist
- Social media consultant/manager
- ICT lecturer/professor
- Back-end developer
- Front-end developer
- Database administrator
- Cloud systems engineer
- Artificial intelligence engineer
- IT business analyst
- Product owner
- Blockchain engineer
- IoT architect
- DevOps engineer
- Mobile app developer
- UI/UX designer
- Full stack developer
- I have not decided yet

29. Employment in the ICT sector in Georgia nowadays is:

- Easier for women
- Easier for men
- Equally easy/difficult for both sexes

30. According to your information, how easy is it to find a job in your profession? (Please select from 1 (difficult) to 5 (easy))

31. Do you think you will be competitive in the labour market considering your skills and capacity? (Please select from 1 (not competitive) to 5 (very competitive))

32. At the later stage of the study, focus groups will be organized. If you are eager to participate, please provide your email address.

Annex B – List of universities and VET colleges attended by the online survey participants (ICT students of universities and VET colleges)

1. Ivane Javakhishvili Tbilisi State University
2. Ilia State University
3. Batumi Shota Rustaveli State University
4. Agricultural University of Georgia
5. Iakob Gogebashvili Telavi State University
6. Georgian Technical University
7. Free University of Tbilisi
8. The University of Georgia
9. Caucasus University
10. International Black Sea University
11. Georgian American University
12. David Aghmashenebeli University of Georgia
13. New Vision University
14. Business and Technology University
15. Kutaisi International University
16. Gori State University
17. San Diego State University
18. European University
19. Community College “Information Technology Academy”
20. Community College “Mermisi”
21. Community College “Spektri”
22. Vocational College “Black Sea”
23. Vocational College “Modusi”

Annex C – List of companies, organizations and universities interviewed

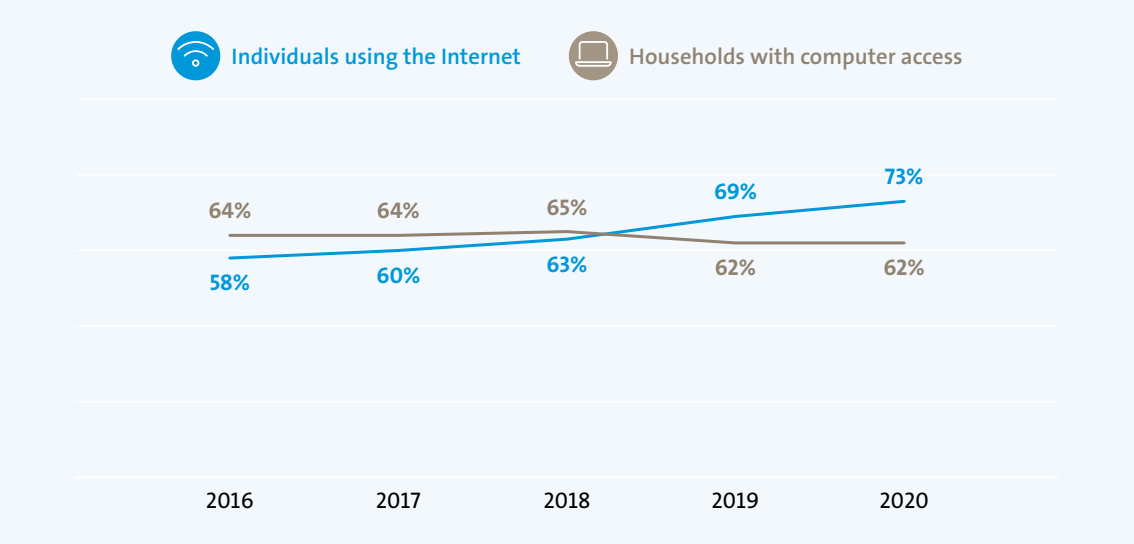
Target	Method	Amount	Participants
University and VET representatives and experts	In-depth interviews	7	▸ Tbilisi State University ▸ Caucasus University ▸ Kutaisi International University ▸ Business and Technology University ▸ Georgian Technical University ▸ LEPL Community College "Information Technology Academy" ▸ LEPL Vocational College "Modusi"
Representatives of companies in the ICT sector and their women employees	In-depth interviews	8 (two per company)	▸ Sweeft Digital ▸ Lemondo ▸ United Global Technologies ▸ Leavingstone
Industry experts	In-depth interviews	5	▸ GITA ▸ EU4Digital ▸ GCCI ▸ Enterprise Georgia
School students	Focus groups (FG)	3	▸ 2 FGs in regions ▸ 1 FG in Tbilisi
Selected group of university/VET students in ICT	Focus groups (FG)	3	ICT students in bachelor's programmes and in VET colleges

Annex D – Secondary research: Additional data

Access to ICT infrastructure

FIGURE E.1

Internet use and computer access trends in Georgia, 2016–2020

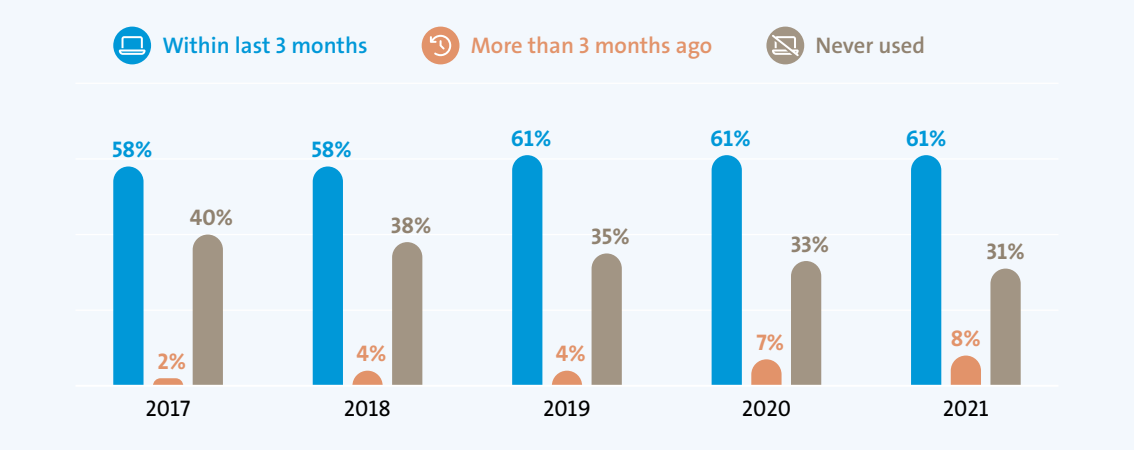


Source: ITU 2017–2020.

Computer use

FIGURE E.2

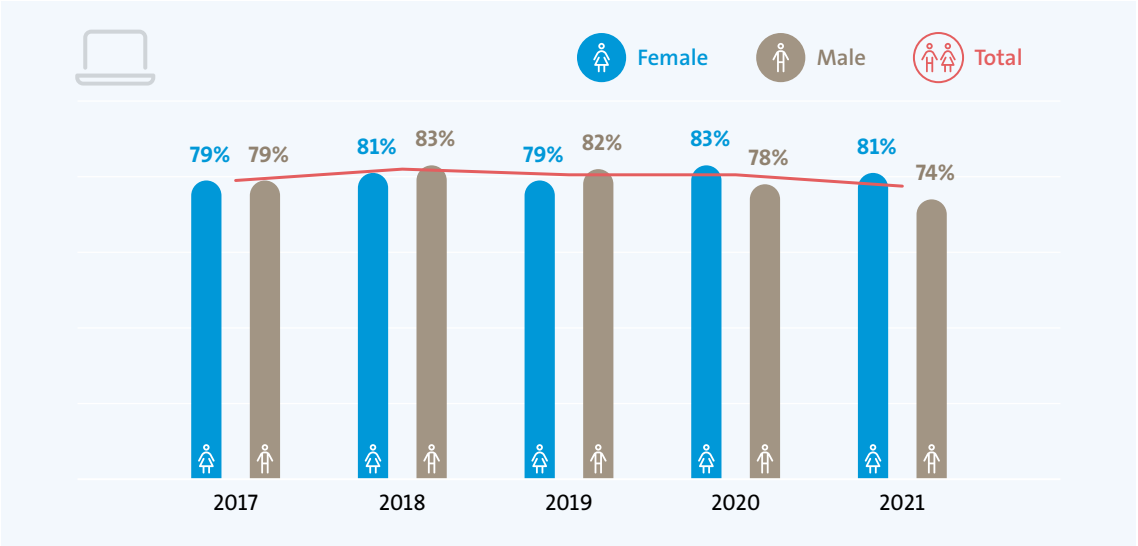
Share of population in Georgia that uses a computer, 2017–2021



Source: Geostat 2017–2021c.

FIGURE E.3

Daily and almost daily computer users in Georgia, by gender, 2017–2021

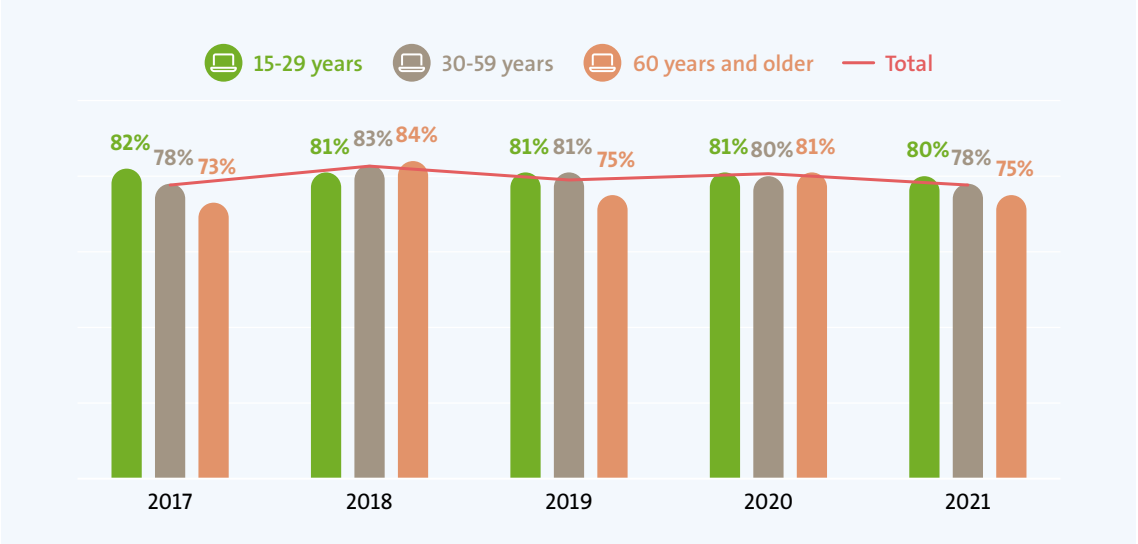


Source: Geostat 2017–2021a.

Note: The figure only includes individuals who have used a computer within the last three months.

FIGURE E.4

Daily and almost daily computer users in Georgia, by age group, 2017–2021

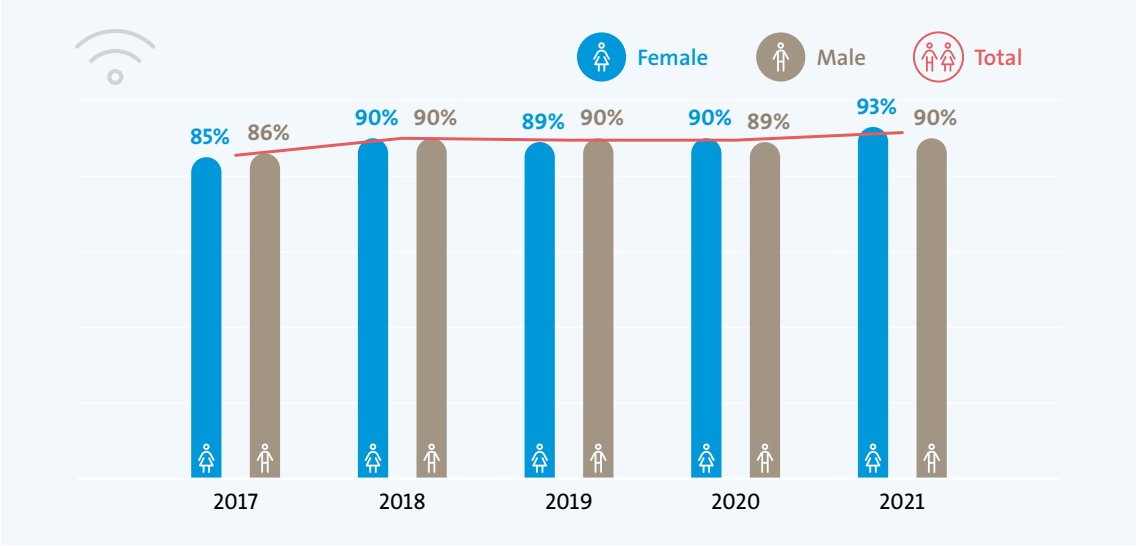


Source: Geostat 2017–2021a.

Note: The figure only includes individuals who have used a computer within the last three months.

FIGURE E.5

Daily and almost daily Internet users in Georgia, by gender, 2017–2021

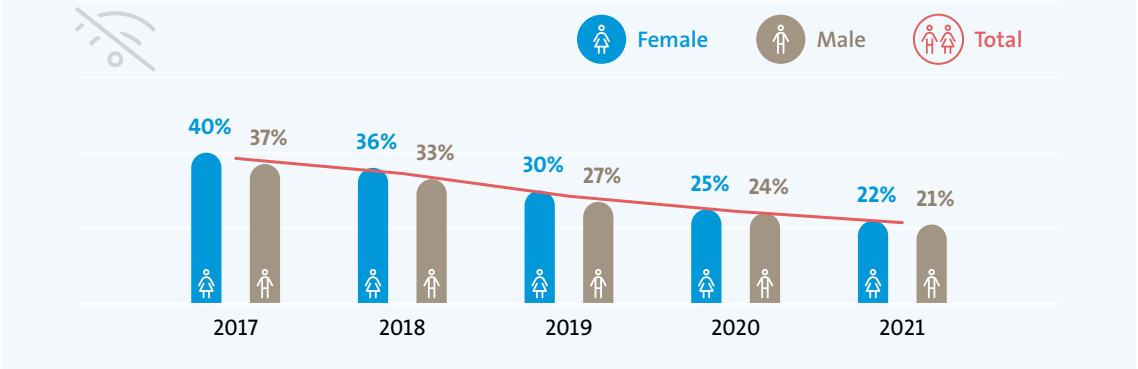


Source: Geostat 2017–2021b.

Note: The figure only includes individuals who have used the Internet within the last three months.

FIGURE E.6

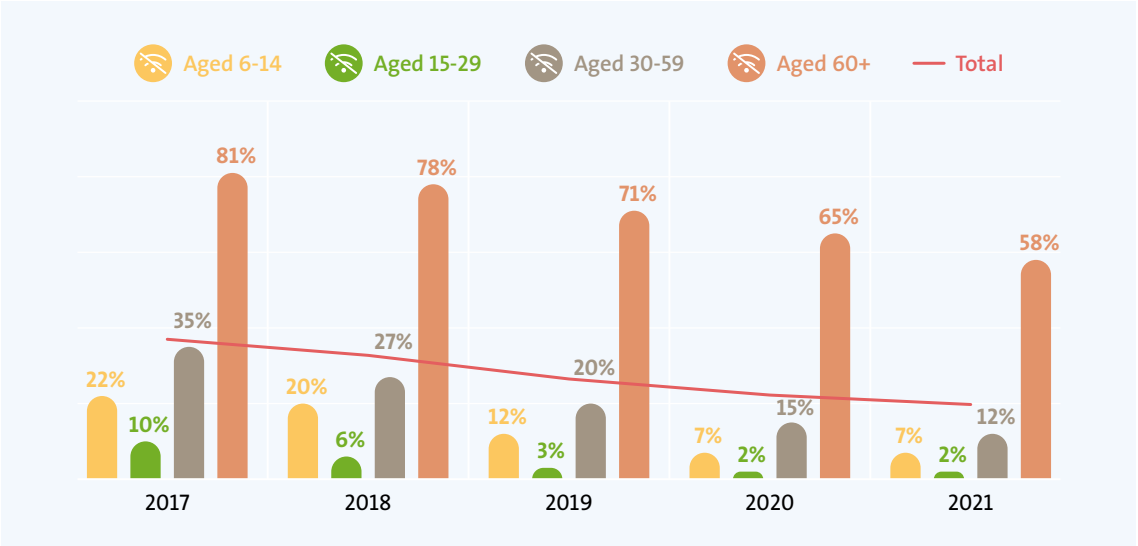
Population in Georgia who has never used the Internet, by gender, 2017–2021



Source: Geostat 2017–2021d.

FIGURE E.7

Population in Georgia who has never used the Internet, by age group, 2017–2021

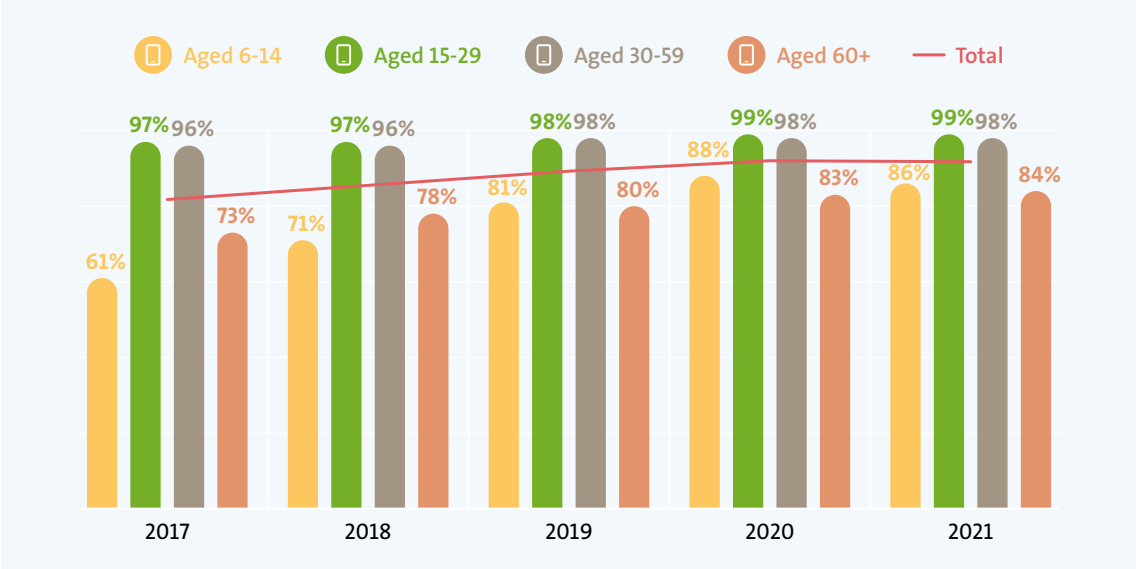


Source: Geostat 2017–2021d.

Mobile phone use

FIGURE E.8

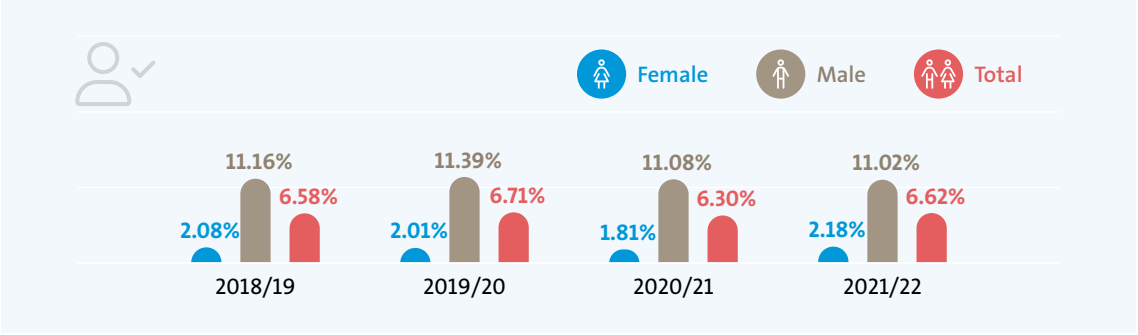
Population in Georgia who uses a mobile phone, by age group, 2017–2021



Source: Geostat 2017–2021f.

FIGURE E.9

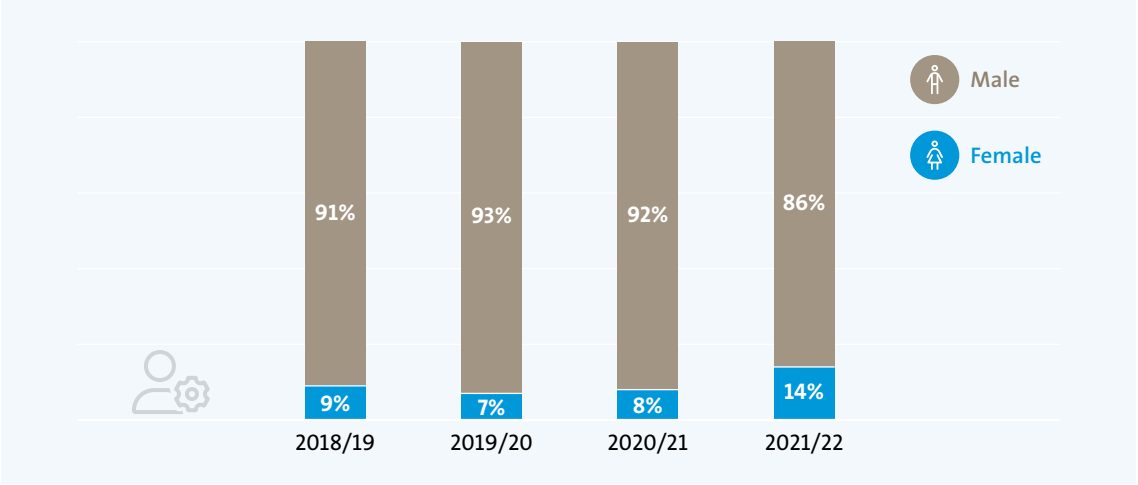
Share of students admitted to ICT bachelor's programmes (by gender) compared to students admitted to all bachelor's programmes (total)



Source: Geostat 2018–2022.

FIGURE E.10

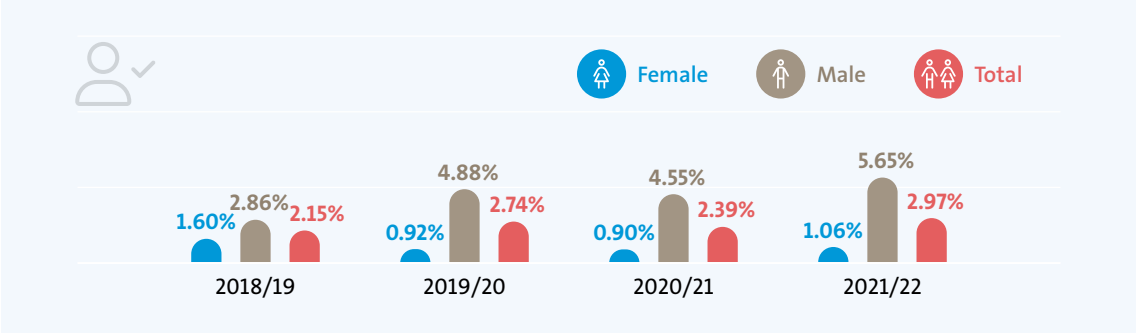
Gender balance of the students admitted to engineering bachelor's programmes



Source: Geostat 2018–2022.

FIGURE E.11

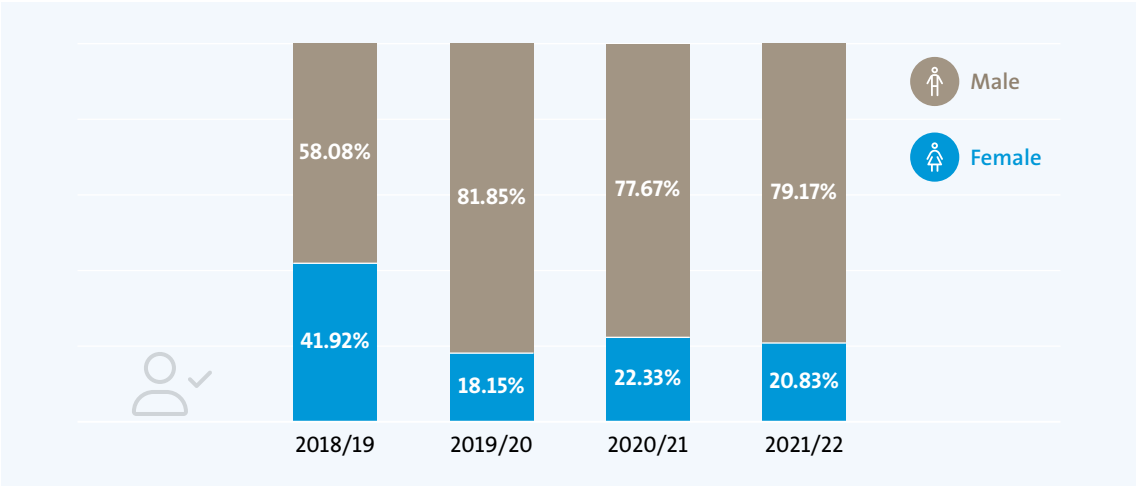
Share of students admitted to ICT master's programmes (by gender) compared to students admitted to all master's programmes (total)



Source: Geostat 2018–2022.

FIGURE E.12

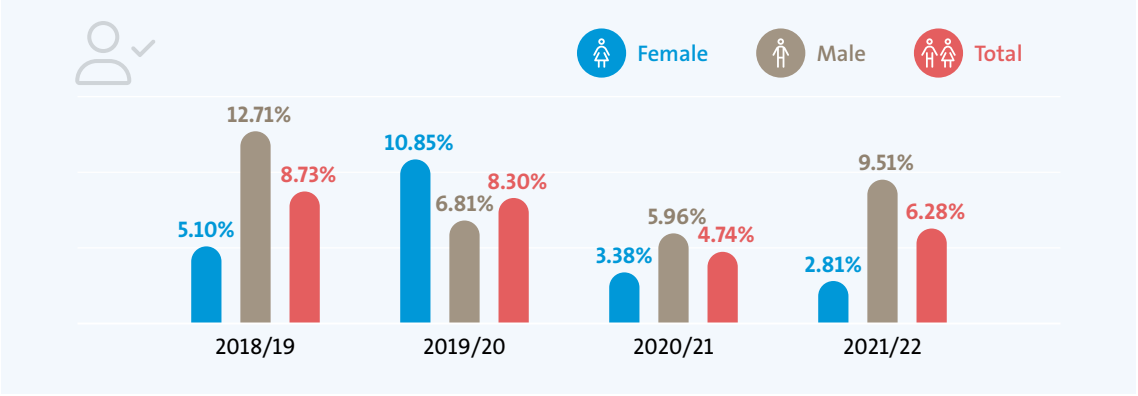
Gender balance of the students admitted to ICT master's programmes



Source: Geostat 2018–2022.

FIGURE E.13

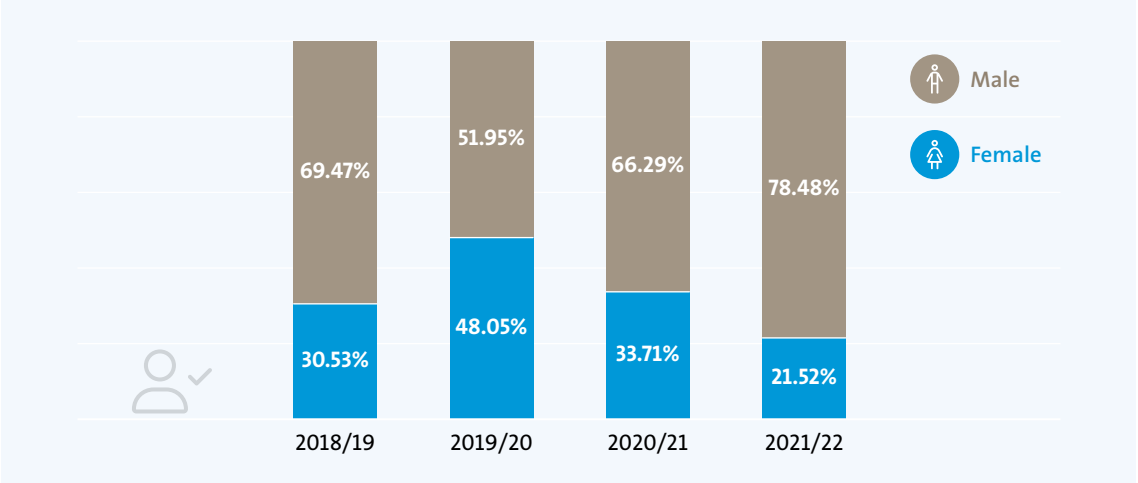
Share of students admitted to ICT PhD programmes (by gender) compared to students admitted to all PhD programmes (total)



Source: Geostat 2018–2022.

FIGURE E.14

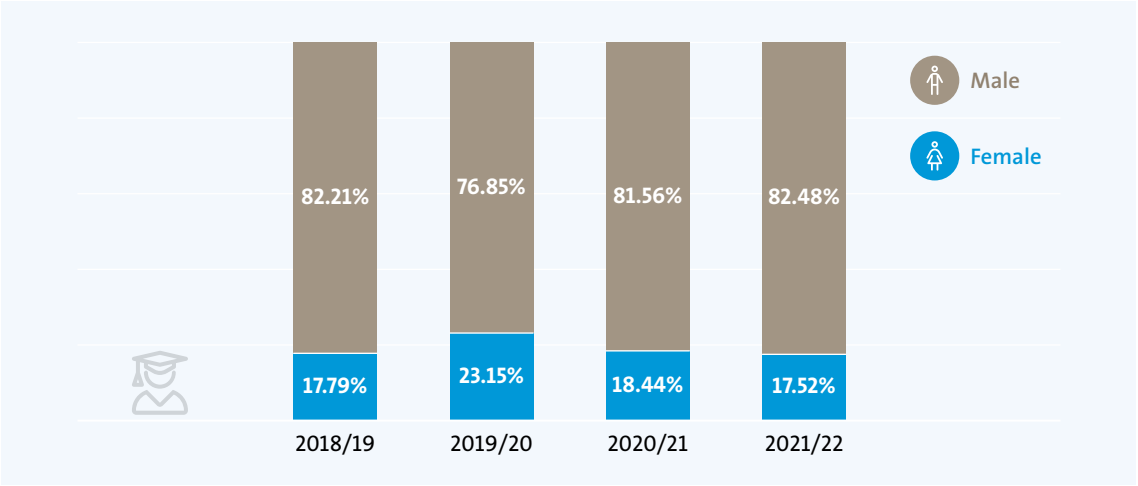
Gender balance of the students admitted to ICT PhD programmes



Source: Geostat 2018–2022.

FIGURE E.15

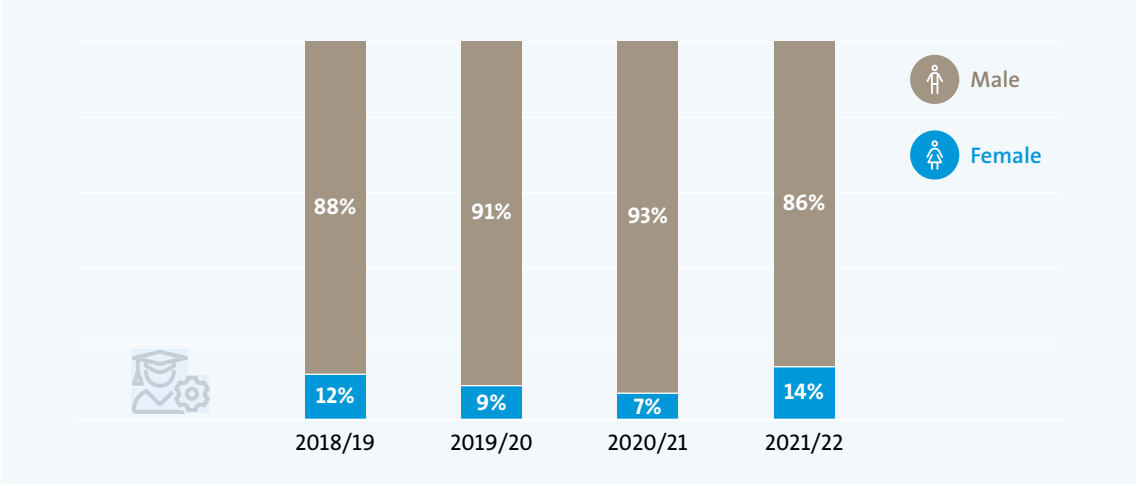
Gender balance of the graduates from ICT bachelor's programmes



Source: Geostat 2018–2022.

FIGURE E.16

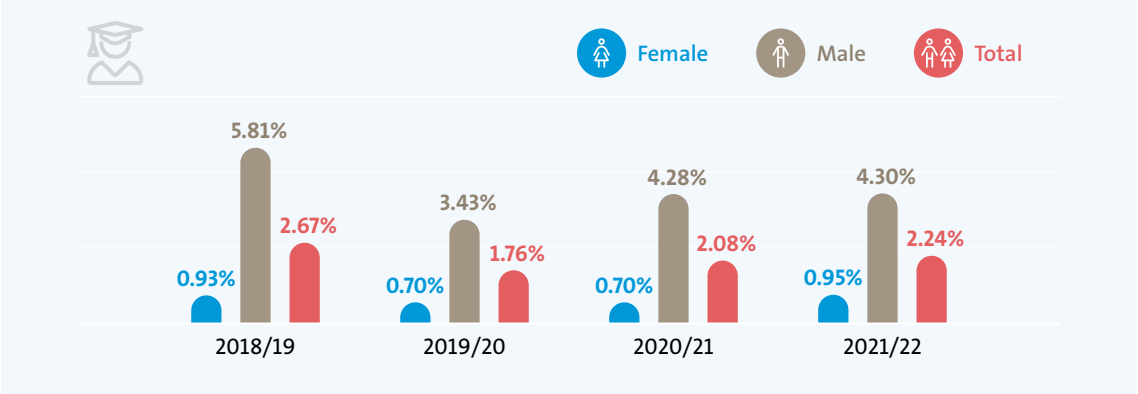
Gender balance of the graduates from engineering bachelor's programmes



Source: Geostat 2018–2022.

FIGURE E.17

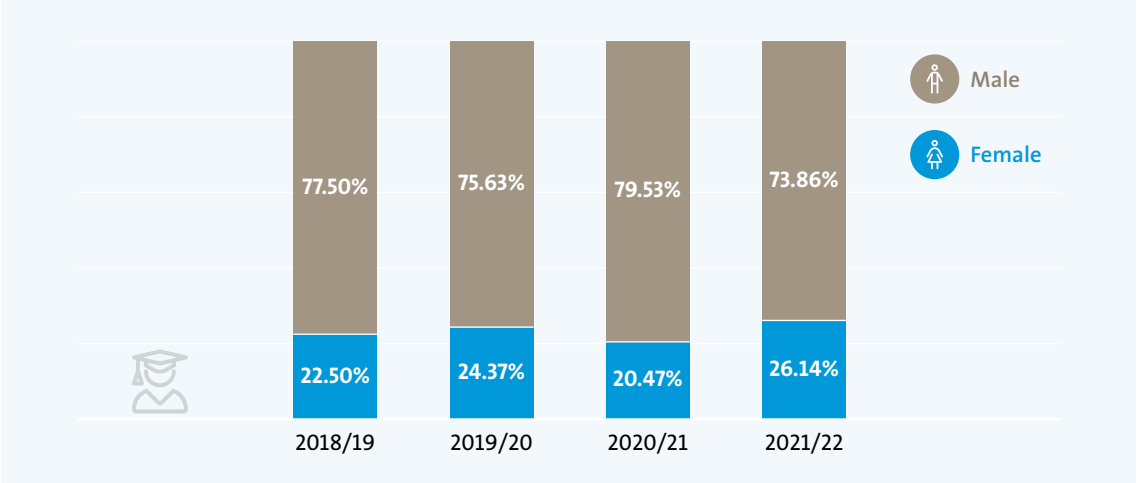
Share of graduates from ICT master's programmes (by gender) compared to graduates from all master's programmes (total)



Source: Geostat 2018–2022.

FIGURE E.18

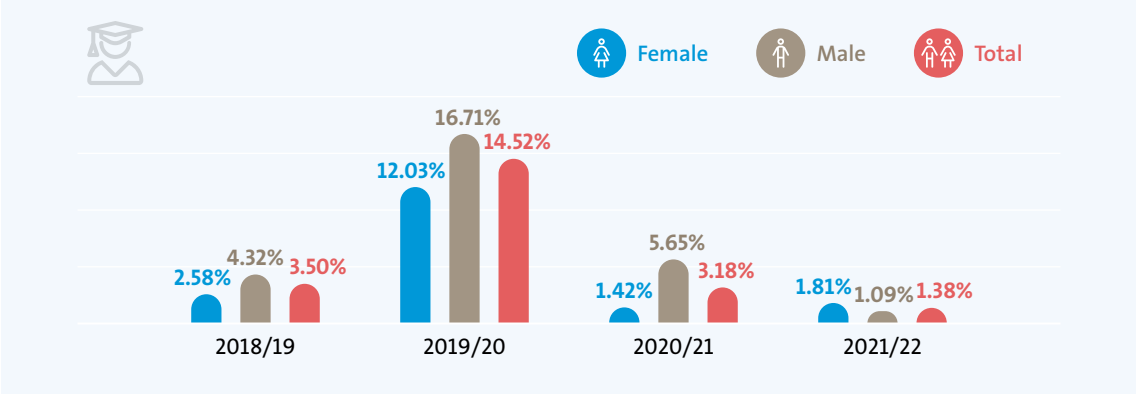
Gender balance of the graduates from ICT master's programmes



Source: Geostat 2018–2022.

FIGURE E.19

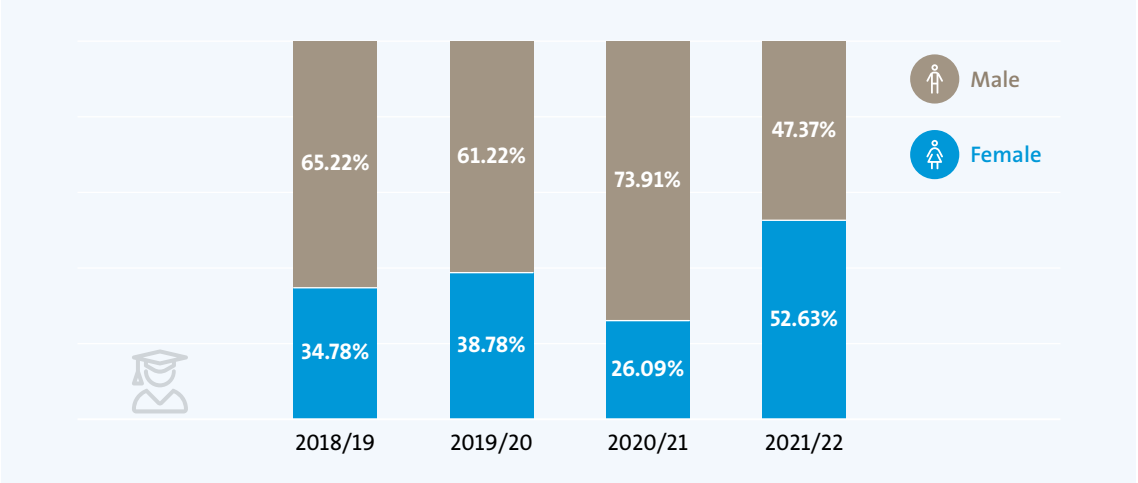
Share of graduates from ICT PhD programmes (by gender) compared to graduates in all PhD programmes (total)



Source: Geostat 2018–2022.

FIGURE E.20

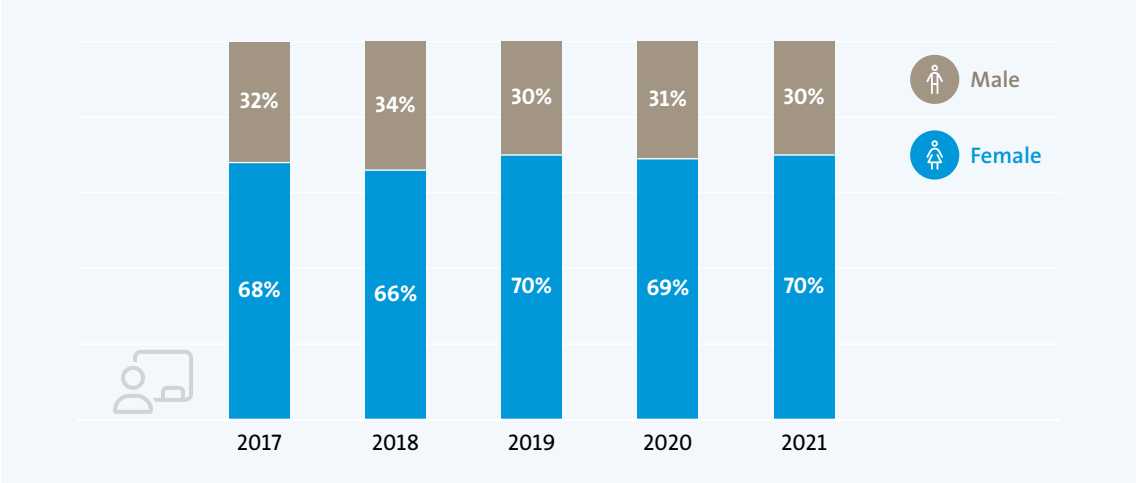
Gender balance of the graduates from ICT PhD programmes



Source: Geostat 2018–2022.

FIGURE E.21

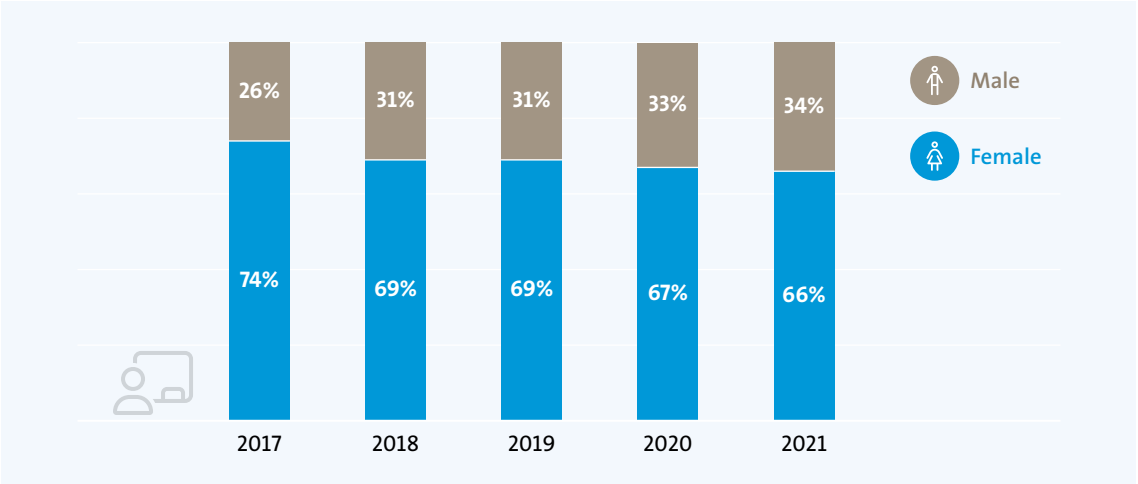
Gender balance of the VET college teachers



Source: Skills Agency Georgia 2017–2021 (document provided to author).

FIGURE E.22

Gender balance of the VET college ICT teachers



Source: Skills Agency Georgia 2017–2021 (document provided to author).

ENDNOTES

Chapter 1

1 ITU 2021b.

2 World Bank 2021.

3 The definition of the sectors covered by the ICT sector varies by sources. As agreed with UN Women, the major focus of the study is related to the professions in the technology sector and engineering jobs related to computer engineering.

Chapter 3

1 OECD 2002, annex 1.

2 CompTIA 2022.

3 OECD 2020.

4 ITU 2021a.

5 Eurofound 2021.

6 Statista 2022.

7 Eurostat 2022.

8 EIGE 2020.

9 WEF 2022.

10 Broadband refers to high-speed Internet access that is always on and faster than traditional dial-up access. Broadband includes several high-speed transmission technologies such as: Digital Subscriber Line (DSL), Cable Modem, Fibre, Wireless, Satellite, and Broadband over Powerlines (BPL) (FCC 2014).

11 ITU 2021a.

12 ITU 2017–2020 (specifically 2020).

13 Mobile cellular subscriptions refer to the number of subscriptions to a public mobile telephone service that provides access to the public switched telephone network (PSTN) using cellular technology. It includes the number of post-paid subscriptions and the number of active prepaid accounts.

14 Fixed telephone subscriptions refer to the sum of all active analogue fixed telephone lines, voice-over-IP (VoIP) subscriptions, fixed wireless local loop (WLL) subscriptions, ISDN voice-channel equivalents, fixed public payphones and satellite-based subscriptions provided to fixed locations that allow for a voice communication.

15 ITU 2017–2020.

16 Fixed broadband subscriptions refer to fixed subscriptions to high-speed access to the public Internet divided by the population and multiplied by 100.

17 Active mobile broadband subscriptions refer to the sum of active handset-based and computer-based (USB/dongles) mobile broadband subscriptions that allow access to the Internet.

18 ITU 2017–2020 (specifically 2020).

19 Ibid.

20 Communications Ombudsman 2020.

21 Ookla 2021.

22 ITU 2017–2020 (specifically 2020).

23 Ibid.

24 ITU 2017–2020.

25 Ibid.

26 ITU 2021a.

27 ITU 2017–2020.

28 Geostat 2017–2021d.

29 Ibid.

30 Geostat 2017–2021b (specifically 2021).

31 Geostat 2017–2021a (specifically 2021).

32 Geostat 2017–2021f.

33 Geostat 2017–2021e.

34 Geostat 2017–2021a.

35 Geostat 2017–2021b.

36 Ibid.

37 Geostat 2021.

38 Geostat 2017–2021d.

39 Government of Georgia 2020.

40 Geostat 2018–2022. Geostat defines computing programmes according to the UNESCO Institute for Statistics, International Standard Classification of Education (ISCED) 2011. Computing programmes include the computer sciences: system design, computer programming, data processing, networks, and operating systems (software development only).

41 Geostat 2018–2022.

42 STEM subjects that cover science, technology, engineering and mathematics are typically referred to as technical.

43 Geostat 2018–2022.

44 Ibid.

45 Ibid.

46 Ibid.

47 Ibid.

48 Ibid.

49 Ibid.

50 Eurostat 2008.

51 Ibid.

52 The main reasons for not choosing ICT as their educational field are summarized in Figure 3.57.

Chapter 5

1 The European Credit Transfer and Accumulation System (ECTS) is a points system used by universities and agreed to by governments that makes international education more easily comparable across borders.

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