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ICT SKILLS DEVELOPMENT IN THE REPUBLIC OF UZBEKISTAN

Insight Report with Recommendations

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IN THE REPUBLIC OF UZBEKISTAN

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2025

UNESCO Institute for Information Technologies in Education

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Acronyms

AI	Artificial Intelligence
AR	Augmented Reality
DT	Digital Technologies
EGDI	E-Government Development Index
GDP	Gross Domestic Product
GNI	Gross National Income
GTCI	Global Talent Competitiveness Index
HCI	Human Capital Index
HDI	Human Development Index
HEMIS	Higher Education Management Information System
ICT	Information and Communication Technologies
IDI	ICT Development Index
ILO	International Labour Organization
IOI	International Olympiad in Informatics
IOM	International Organization for Migration
IoT	Internet of Things
IT	Information Technologies
IT-Park	Technological Park of Software Products and Information Technologies of Uzbekistan
ITU	International Telecommunication Union
MDT	Ministry of Digital Technologies of the Republic of Uzbekistan
OECD	Organization for Economic Cooperation and Development
ODIN	Open Data Inventory (by Open Data Watch)
R&D	Research and Development
STEM	Science, Technology, Engineering and Mathematics
TIIAME	Tashkent Institute of Irrigation and Agricultural Mechanization Engineers
TUIT	Tashkent University of Information Technologies named after Muhammad Al-Khwarizmi
UIS	UNESCO Institute for Statistics
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UN DESA	United Nations Department of Economic and Social Affairs
UNESCO	United Nations Educational, Scientific and Cultural Organization
USD	United States Dollar
UI	User Interface
UX	User Experience
UZS	Uzbek Sum
VR	Virtual Reality
WIPO	World Intellectual Property Organization

Executive Summary

The insight report on the state-of-the-art and perspectives of the development of ICT skills in the Republic of Uzbekistan was elaborated within the project "Al Capacity Building in Arabic-Speaking Countries and Promoting ICT Education in Central Asia", implemented by the UNESCO Institute for Information Technologies in Education (UNESCO IITE) and Huawei. This project is designed to facilitate the digital transformation of the national economies and strengthen the national capacity of Central Asian countries through ICT talent development for the achievement of the Sustainable Development Goal 4 "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all", reconsidering higher education and TVET to meet the evolving needs of the labour market and further development of ICT skills strategy.

The report offers a comprehensive assessment of key policies, emerging trends and existing challenges in Uzbekistan`s digital economy, labour market and higher education system through the lens of ICT skills development. The study is based on the extensive desk research of legal documents and statistical data, ministerial reports, university websites and research publications. The report findings aim to guide policymakers, educators and industry leaders in shaping effective strategies that will drive the growth of skilled ICT workforce, foster innovation and enhance Uzbekistan digital economy.

The publication consists of an introduction, a country overview, three chapters, conclusions and recommendations. The Introduction summarizes key research tasks, explains the choice of research methods and describes data sources. The Country Overview provides general information about the country's context, including essential geographic, demographic, economic and social characteristics.

The chapter "Policy and Governance Frameworks for Digital Transformation" outlines the Government's efforts aimed at developing comprehensive strategies and policies to drive digital transformation and enhance governance efficiency of the country. The laws on informatization, personal data protection, transparency, cybersecurity, telecommunications and e-government are implemented to foster the development of a knowledge-based economy. The Strategies "Digital Uzbekistan–2030" and "Uzbekistan–2030" emphasize expanding digital infrastructure, increasing IT sector employment and boosting competitiveness. The country's commitment to e-government development has resulted in a considerable progress in online services and public participation. Government initiatives aimed at increasing the investments into IT education and digital infrastructure are a prerequisite for sustainable economic growth and broad access to digital opportunities.

The chapter "Digital Economy and ICT Infrastructure" showcases Uzbekistan's strides in advancing digital economy through extensive reforms and strategic initiatives. Implementation of the government policies resulted in the expansion of the ICT sector and the increase of its share in the gross domestic product (GDP), the growth of high-tech exports, including IT goods and services exports, as well as infrastructure upgrade. The establishment of IT Parks has played a crucial role in fostering innovation and digital entrepreneurship, offering a competitive ecosystem for IT companies. Due to investments into the ICT infrastructure, connectivity and internet penetration have improved significantly; however, issues related to digital inclusion remain. Social media adoption has surged, which expanded their role in education and marketing.

The chapter “Human Capacity for Digital Economy: Knowledge, Skills and Employability” explores the transformation of higher education under the influence of digital technologies and labour market demands for ICT and related competencies. The recent growth of tertiary enrolment has been driven by educational reforms and the expansion of the higher education sector. The chapter highlights that higher education has seen advancements under the “Digital Uzbekistan — 2030” strategy, with the implementation of the Higher Education Management Information System (HEMIS) and plans for a unified DATAHUB. Universities have enhanced digital capacity with modern servers and high-speed internet. National initiatives, such as “One Million Uzbek Coders”, “IT Talents”, IT certification subsidies and others, are aimed at enhancing human capital to meet the demands of the digital economy. Strengthening digital literacy, fostering IT talent and improving the quality of tertiary education is crucial to ensure Uzbekistan’s workforce competitiveness in the global economy. The chapter provides an overview of Uzbekistan’s research and development (R&D) sector in the field of ICT and AI. The initiatives aimed to strengthen research capacity in AI are supported by the establishment of specialized research institutes and laboratories. The section examines labour-market developments and analyses the composition and dynamics of the ICT workforce, outlining the key demand for and supply of qualified specialists in the ICT labour market.

The Conclusions and Recommendations section summarizes the achievements and key challenges faced by Uzbekistan with reference to the country’s rankings in recognized global indices. Key recommendations to accelerate digital transformation include developing a comprehensive digital education strategy and upgrading IT infrastructure of higher education institutions (HEIs). To strengthen the IT workforce and bolster Uzbekistan’s competitiveness, it is recommended to update curricula to cultivate IT talent; deepen academia–industry partnerships in education, research and development; roll out targeted upskilling and reskilling programmes aligned with emerging industry demands and introduce measures to achieve gender balance.

Annex to this document contributed by Huawei Technologies describes Huawei’s philosophy and framework for developing ICT talent and explains why cultivating digital skills is seen as a long-term investment, central to innovation and economic progress, aligned with national visions.

Introduction

In the rapidly evolving world, technology plays an increasingly important role in human lives, digital skills become indispensable to keep up with the pace of innovation and unlock a vast array of opportunities. In the labour market, proficiency in using digital technologies has become a fundamental requirement for professionals across all economic sectors. With the rise of technology and the digitalization of various business processes, employers look for candidates with strong digital and soft skills, including proficiency in using software and applications, data analysis, digital marketing, social media management, creative thinking, foreign language proficiency, etc. The development of both fundamental and advanced ICT competencies is essential for navigating everyday life and achieving career success in the digital era.

A series of insight reports is produced within the project "Al Capacity Building in Arabic-Speaking Countries and Promoting ICT Education in Central Asia" implemented by the UNESCO Institute for Information Technologies in Education with the support of Huawei. The overall purpose of the project is to strengthen the national capacity development in several UNESCO Members States in terms of ICT-related skills to enhance the quality of learning and expand access to relevant career opportunities and contribute to the achievement of the Sustainable Development Goal 4 aiming to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all".

This insight report is focused on Uzbekistan and intends to:

- provide an overview of the socio-economic context and digital landscape of the country;
- outline government commitment to the development of the national economy and ICT industry in relation to policy instruments and e-government services;
- evaluate the ICT sector and digital infrastructure and identify the prerequisites for the digital transformation of the economy;
- elaborate on the alignment of higher education and training programmes with the labour-market requirements for ICT skills;
- clarify the status of research and development in ICT and AI;
- identify the principal challenges within the ICT sector that affect the development of ICT and AI capacity;
- provide key conclusions and propose actionable recommendations for future actions.

The study employed desk research as a key methodology supported by the documentary analysis and synthesis. It incorporated the analysis of the statistical data alongside with a review of relevant qualitative and quantitative secondary information. Data analysis was supplemented by a comprehensive examination of demand and supply factors, evaluation of existing policies and strategies and the assessment of the current conditions against the set objectives:

- data from international organizations, including UN, UNDP, UN DESA, UNESCO, UIS, World Bank, ILO, ITU, UNCTAD and OECD;
- global rankings and indices, including the Global Talent Competitiveness Index, Global Knowledge Index, Legatum Prosperity Index, Huawei Global Digitalisation Index, Government AI Readiness Index, Network Readiness Index, Global Innovation Index, ICT Development Index, Global Attractiveness Index, Global Sustainable Competitiveness Index, E-Government Development Index, E-Participation Index, etc.;
- policy documents, strategies, reports and data published by the national agencies focusing on IT and talent development, namely the National Statistics Committee of the Republic of Uzbekistan, the National Database of Legislation of the Republic of Uzbekistan, the Ministry of Digital Technologies of the Republic of Uzbekistan (MDT), IT Park of Uzbekistan;
- other relevant publications.

Country Overview

Uzbekistan, officially the Republic of Uzbekistan, is a double landlocked country located in Central Asia with a surface area of 448,969 square kilometres.[1] It borders with Kazakhstan, Kyrgyzstan, Afghanistan, Turkmenistan and Tajikistan. The population of Uzbekistan is growing rapidly. According to the World Bank,[2] it has increased by 5.93 million people over ten years from 29.72 million people in 2013 to 35.65 million people in 2023.[3] Today, it is the most populous country in the Central Asian region with the population density of 79 people per square kilometre[4] and the annual population growth rate of 2%.[5] By the end of 2023, the number of females was 17.67 million,[6] accounting for 49.6% of the total population.

Table 1. Demographic indicators

Indicators	2019	2020	2021	2022	2023
Population, total (million)	32.96	33.58	34.24	34.93	35.65
Population growth rate (annual %)	1.8	1.9	1.9	2.0	2.0
Urban population (% of total population)	50	50	50	50	51
Human sex ratio (m per 100 f)*			99.6		

Sources: World Bank Open Data; *UN

From 1950 to 2023, the urban population share steadily increased from approximately 30% to slightly over 50%. By 2050, urbanization is projected to accelerate further, with the urban population expected to exceed 60%.[7] In 2025, the population is almost evenly distributed between urban and rural areas: 51% (19.14 million people) and 49% (18.40 million people), respectively.[8] Uzbekistan has a predominantly young population: 20.5 million people (55%) are under the age of 35. The share of the working-age population is estimated at 56%.[9,10]

1 UN. 2021. UN Data. Uzbekistan: General Information. https://data.un.org/en/iso/uz.html
2 World Bank. 2023. World Bank Open Data. Population, total — Uzbekistan. https://data.worldbank.org/indicator/SP.POP.TOTL?locations=UZ
3 According to the National Statistics Committee of the Republic of Uzbekistan, as of March 26, 2025, the country's population amounted to 37.54 million people of them 18.63 million females and 18.91 million males. https://stat.uz/en/official-statistics/demography
4 World Bank. 2022. World Bank Open Data. Population density (people per sq. km of land area) — Uzbekistan. https://data.worldbank.org/indicator/EN.POP.DNST?locations=UZ
5 World Bank. 2023. World Bank Open Data. Country Profile. Uzbekistan. https://data.worldbank.org/country/uzbekistan
6 World Bank. 2023. World Bank Open Data. Population, female — Uzbekistan. https://data.worldbank.org/indicator/SP.POP.TOTL.FE.IN?locations=UZ
7 UN DESA. 2018. World Urbanization Prospects 2018: Uzbekistan Country Profile. Percentage of Population in Urban and Rural Areas. https://population.un.org/wup/countryprofiles?country=Uzbekistan
8 National Statistics Committee of the Republic of Uzbekistan. 2025. Open Data. Demography. https://stat.uz/en/official-statistics/demography
9 Ibid.
10 According to the Labour Code of the Republic of Uzbekistan, the working age of men is from 16 to 60 and of women from 16 to 55. https://lex.uz/ru/docs/6257291

Since the introduction of comprehensive liberalization reforms in 2017, Uzbekistan has undergone significant transformation towards an open, export-oriented and private-sector-oriented economy (Ambasz et al., 2023). The country is the second largest economy in Central Asia. Its lower-middle-income economy is rapidly developing in line with the government ambitions to achieve the upper-middle income status by 2030. Uzbekistan's GDP has grown from 69.7 billion USD in 2017 to 101.59 billion USD in 2023.[11] In 2020, when the average global GDP growth rate declined to -2.9%, Uzbekistan's growth rate declined to 1.6%, which demonstrated resilience despite global challenges and economic downturn.[12] GDP growth rate reached 8% in 2021.[13] Uzbekistan maintains a stable GDP growth due to its large workforce, extensive domestic market, diversified manufacturing capacity and consistent implementation of market reforms.

Table 2. Gross domestic product of Uzbekistan

Indicators	2019	2020	2021	2022	2023
Gross domestic product (billion, current USD)	67.29	66.44	77.34	90.1	101.59
GDP per capita (current USD, thousand)	2,041.4	1,978.3	2,258.5	2,578.7	2,849.5
GDP growth (annual %)	6.8	1.6	8	6	6.3

Source: World Bank Open Data

The economy of Uzbekistan relies on natural resources and agriculture. The country holds abundant reserves of strategic minerals, ranking among the top ten countries worldwide: in gold, uranium, copper and potassium salt. The mining sector plays an important role in the economic development of the country and contributes significantly to export revenue, job creation and economic diversification. Natural gas drives the energy sector, supported by the automotive manufacturing and machinery industries (Ministry of Mining Industry and Geology of the Republic of Uzbekistan, 2023). A vital part of the economy is agriculture accounting for approximately 25% of GDP and employing 26% of the workforce. The country is among the top global cotton producers and exporters; it is also a leading producer of fruits, vegetables, wheat and other grains, as well as poultry and livestock products. Major exports include gold, cotton, uranium, natural gas, fertilizers, metals, textiles and agricultural products. In recent years, gradual optimization of the economic structure was supported by expansion in service, transport and tourism sectors combined with industrial modernization (MDT, 2025a).

The informal and hidden economy represents a significant share of economic activity, accounting for 34.8% of GDP.[14] Remittances remain an important component of the national economy and a vital source of household income across regions. In 2023, remittance inflows were equivalent to 13.9% of GDP.[15]

[11] World Bank. 2023. World Bank Open Data. GDP (current USD) — Uzbekistan. https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=UZ

[12] World Bank. 2023. World Bank Open Data. GDP growth (annual %). https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

[13] World Bank. 2023. World Bank Open Data. GDP growth (annual %) — Uzbekistan. https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=UZ

[14] National Statistics Committee of the Republic of Uzbekistan. 2024. Open Data. Share of informal and hidden economy in GDP, in percent. https://stat.uz/en/official-statistics/national-accounts#

[15] World Bank. 2023. World Bank Open Data. Personal remittances, received (% of GDP) — Uzbekistan. https://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS?locations=UZ&most_recent_value_desc=true

The labour market has shown steady improvement, which justifies the effectiveness of policies aimed at fostering employment growth. The total unemployment rate decreased from 5.4% in 2021 to 4.5% in 2022–2023, the lowest since 2019.[16] According to the World Bank, the labour force participation rate in 2023 was fairly high for males (72.5%) and relatively low for females (39.6%).[17] The unemployment rate for individuals aged 15–24 declined from 13% in 2021 to 11% in 2022 and to 10.9% in 2023.[18] Similarly, the unemployment rate for individuals aged 25 and above decreased from 4% in 2020 to 3.5% in 2022–2023.[19]

Table 3. Labour market participation and unemployment in Uzbekistan

Indicator	2019	2020	2021	2022	2023
Labour force participation, total (% of total population ages 15+)[20]	56	56	56	56	56
Labour force participation rate (% of male population ages 15+)	73.4	72	72.8	72.7	72.5
Labour force participation rate (% of female population ages 15+)	39.6	39.1	39.6	39.6	39.6
Unemployment, total (% of total labour force)	4.9	5.3	5.4	4.5	4.5
Unemployment, male (% of male labour force)[21]	6	3.9	n/a	n/a	n/a
Unemployment, female (% of female labour force)[22]	12.8	7.7	n/a	n/a	n/a
Unemployment, total (% of total population ages 15-24)*	11.2	12.8	13	11	10.9
Unemployment, total (% of total population ages 25+)*	3.8	4	4.1	3.5	3.5

Sources: World Bank Open Data based on ILO data and estimates, *ILOSTAT

To accelerate sustainable national growth, Uzbekistan has implemented a number of development strategies, including the Action Strategy for the Five Priority Areas of Development of the Republic of Uzbekistan for 2017–2021, the Strategy "Uzbekistan–2030" and the Development Strategy of the New Uzbekistan for 2022–2026.

Since early 2000s, Uzbekistan prioritized digital transformation and ICT development. Under the leadership of President Shavkat Mirziyoyev, the country launched an ambitious agenda designed to enhance economic competitiveness and generate high-quality employment opportunities through accelerated digital transformation. Major initiatives to expand e-government, modernize public services and build digital infrastructure were introduced in 2020, declared the Year of Science, Enlightenment and Digital Economy.

16 World Bank. 2023. World Bank Open Data. Unemployment, total (% of total labour force) (modelled ILO estimate) — Uzbekistan. https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS?locations=UZ

17 World Bank. 2023. World Bank Open Data. Uzbekistan. Labor force participation rate, by sex (% of population ages 15+) (modelled ILO estimate). https://genderdata.worldbank.org/en/economies/uzbekistan

18 ILO. 2024. ILOSTAT: Unemployment rate by sex and age. Uzbekistan. (ILO modelled estimates). https://rshiny.ilo.org/dataexplorer35/?lang=en&segment=indicator&id=UNE_2EAP_SEX_AGE_RT_A

19 ILO. 2024. ILOSTAT: Unemployment rate by sex and age. Uzbekistan. (ILO modelled estimates). https://rshiny.ilo.org/dataexplorer35/?lang=en&segment=indicator&id=UNE_2EAP_SEX_AGE_RT_A

20 World Bank. 2023. World Bank Open Data. Labour force participation rate, total (% of total population ages 15+) (modelled ILO estimate) — Uzbekistan. https://data.worldbank.org/indicator/SL.TLF.CACT.ZS?locations=UZ

21 World Bank. 2020. World Bank Open Data. Unemployment, male (% of male labour force) (national estimate) — Uzbekistan. https://data.worldbank.org/indicator/SL.UEM.TOTL.MA.NE.ZS?locations=UZ

22 World Bank. 2020. World Bank Open Data. Unemployment, female (% of female labour force) (national estimate) — Uzbekistan. https://data.worldbank.org/indicator/SL.UEM.TOTL.FE.NE.ZS?locations=UZ

Clear targets were set for industries and regions to adopt new technologies, enhance service delivery, reduce administrative barriers and mitigate corruption risks. Efforts were focused on the digitalization of healthcare, education and other key sectors, as well as expanding specialized IT training to cultivate a skilled workforce (President of the Republic of Uzbekistan, 2020a).

At the summit of the Organization of Turkic States held in 2024, the country outlined its vision for intensifying digital transformation efforts across the Turkic region. Leaders of the member states committed to advancing e-commerce and digital financial technologies by streamlining cross-border trade, implementing digital payment systems and electronic invoicing, safeguarding personal data and consumer rights, and strengthening regional digital infrastructure. President Shavkat Mirziyoyev proposed the idea of founding a Digital Turkic World to promote IT expertise exchange, build innovative ecosystems and develop shared digital infrastructure and data centres. He also called for the establishment of a Turkic Development Bank, resurgence of the Turkic Investment Fund and the development of common e-commerce platforms (President of the Republic of Uzbekistan, 2024a).

Recognizing the demographic dividend, the Government of Uzbekistan implements targeted policies to harness youth potential as part of its strategy to develop the country into a regional IT hub.

Policy and Governance Frameworks for Digital Transformation

National laws and strategies

Uzbekistan has established a robust legal and strategic foundation to accelerate digital transformation of the economy, industry and society. A number of laws and legislative acts were enacted by the Government to optimize the institutional framework, redefine the trajectory of the development of digital economy and strengthen the policy framework. These efforts prioritize the development of a highly skilled workforce with strong digital competencies to meet the demands of the modern era. Through technological advancement and education reform, the Government intends to build an ecosystem that fosters economic growth, encourages innovation and enhances Uzbekistan's competitiveness.

The Law of the Republic of Uzbekistan No. 560-II On Informatization (December 11, 2003) regulates relations in the field of informatization, the use of information resources and information systems. The Law defines key concepts, such as informatization, information resource, owner of information resources or information systems, information technology, holder of information resources or information systems, information system and blogger. According to the Law, one of the main directions of state policy in the field of informatization is the training and professional development of personnel, as well as the promotion of scientific research.

The Law of the Republic of Uzbekistan No. LRU-369 On the Openness of the Activities of Public Authorities and Administration (May 5, 2014) regulates relations in the sphere of transparency in the activities of the state authorities and administration. The Law mandates that state authorities ensure transparency by providing information, including in electronic format, to citizens upon request. According to the Law, the official websites of state authorities and administrative bodies are public resources accessible on the internet. The Law also specifies the types of information that the state authorities can publish on their official websites, thereby enhancing transparency and accessibility.

The Law of the Republic of Uzbekistan No. LRU-395 On Electronic Government (December 9, 2015) regulates relations in the field of electronic government. The Law defines e-government as a system of organizational and legal measures, along with technical tools, aimed at enabling the operations of government bodies to provide public services to individuals and legal entities using information and communication technologies, as well as interagency electronic interaction. An electronic public service is defined as a government service delivered using information and communication technologies. The Law envisages measures for training, retraining and professional development of employees in e-government.

The Law of the Republic of Uzbekistan No. LRU-547 On Personal Data (July 2, 2019) governs relationships in the sphere of personal data and defines key terms, including personal data, personal database, processing of personal data, database operator, personal database owner and other terms. Personal data refers to information documented on electronic, paper or other tangible media that pertains to a specific individual or enables their identification.

The Law of the Republic of Uzbekistan No. LRU-764 On Cybersecurity (April 15, 2022) sets out the fundamental principles for ensuring cybersecurity in Uzbekistan, including the rule of law, the prioritization of protecting the interests of individuals, society and the state in cyberspace, a unified regulatory approach, support for domestic producers in developing the national cybersecurity system and openness to international cooperation in the field. As stated in the Article 32 of the Law, one of the areas of the state support for cybersecurity entities is facilitating the training and retraining of personnel in the field of cybersecurity, as well as enhancing their qualifications. Article 34 of the Law emphasizes supporting human resource development in the field of cybersecurity through financial and advisory assistance, along with educational, methodological and scientific-pedagogical support.

The Law of the Republic of Uzbekistan No. LRU-1015 On Telecommunications (December 27, 2024) regulates relations in the field of telecommunications and provides definitions of terms, such as communication line, telecommunications, telecommunications operator and telecommunications network. Article 7 of the Law outlines the key priorities for the development of telecommunications, including the expansion of internet access, the implementation of a unified scientific and technical policy aligned with international standards and the reinforcement of international cooperation in the sector.

The holistic and strategic approaches to the implementation of digital transformation were elaborated in several national strategies.

The Strategy "Digital Uzbekistan–2030", approved by the Decree of the President of the Republic of Uzbekistan No DP-6079 of October 5, 2020, aims at accelerating the digital transformation of the economic sector, the social sphere and the public administration system, with a particular focus on enhancing the provision of electronic public services. It sets out strategic goals, priorities, medium- and long-term objectives for advancing the key areas, including digital infrastructure and economy, e-government, education, health care and agriculture. As part of digital transformation initiatives through 2030, key measures include expanding admission quotas in information technology programmes at higher education and specialized secondary institutions to 20,000, which would be a 185% increase as compared to 7,000 in 2020. To ensure coordinated development, the Strategy incorporates a detailed roadmap with measurable targets, including programmes to advance IT education — such as expanding digital infrastructure in schools, implementing education information systems and supporting the 'One Million Coders' initiative across secondary, vocational and higher education institutions.

The Strategy "Uzbekistan — 2030", enacted through the Decree of the President of the Republic of Uzbekistan No DP-158 of September 11, 2023, outlines 100 strategic objectives across five priority areas, each supported by specific performance indicators to monitor progress and ensure achievement of targeted outcomes. The Strategy prioritizes three digital transformation objectives aligned with performance indicators to drive progress. First, it aims to increase exports of IT services and software products to five billion USD by fostering a competitive digital ecosystem, supporting IT companies, encouraging innovation and building global partnerships. Second, the Strategy seeks to join a top 30 category in the UN E-Government Development Index by enhancing e-government infrastructure, streamlining public services through digital platforms, improving accessibility and increasing transparency. Third, it envisions creating employment for 300,000 youth in the IT sector by investing in education, training programmes and professional development, equipping young people with digital skills to actively participate in the growing digital

economy. Several other performance indicators to be achieved by 2030 include ensuring full internet coverage across all settlements, increasing internet speed tenfold, boosting international connectivity to 5,000 Gbps and achieving 100% coverage with fibre optic and broadband networks. The establishment of an International Digital Technology Centre is planned to attract and support 1,000 representative offices of foreign companies, fostering greater international collaboration and investment in the IT sector.

The Strategy for the Development of Artificial Intelligence Technologies until 2030, adopted by the Resolution of the President of the Republic of Uzbekistan No RP-358 of October 14, 2024, defines the objectives and priority areas for the broad application and accelerated development of artificial intelligence (AI) in the country. The Strategy outlines medium- and long-term tasks, including those in the scientific and technological development, for the implementation of the projects aligned with the national interests using AI technologies. The Strategy emphasizes equipping higher education institutions with the necessary technical tools and devices for practical application of AI, thereby establishing the required infrastructure, enhancing the knowledge and skills of the population and developing human resources for the effective use of AI technologies.

The primary goal of the Resolution of the President of the Republic of Uzbekistan No RP-51 On Additional Measures to Support Activities to Train Qualified Specialists in the Field of Digitalization (February 1, 2024) is to enhance the development of a skilled workforce in the IT sector by supporting non-governmental educational organizations, promoting the acquisition of international IT certifications and creating employment opportunities in IT service export enterprises. By providing financial subsidies, covering certification costs and online public services, the initiative aims to strengthen digital skills of young professionals, boost the competitiveness of IT services in global markets and foster the growth of the sustainable digital economy in Uzbekistan.

E-Government

E-government suggests the provision of online services and the electronic exchange of documents and data among citizens, businesses and government entities. The implementation and development of e-government systems in Uzbekistan are guided by foundational principles designed to enhance the efficiency, accessibility and transparency of public services and to streamline interaction between citizens and government agencies. To foster the culture of trust and innovation, e-government adheres to “openness and transparency in the activities of government agencies; equal access for applicants to the electronic public services; provision of the electronic public services based on the “one-stop-shop”; standardization of government agencies’ documents; use of unified identifiers for e-government; continuous improvement of the process for delivering electronic public services” (Government of the Republic of Uzbekistan, 2015).

The Government of Uzbekistan approved the multi-layered architecture of the e-government system (Government of the Republic of Uzbekistan, 2020b). The architecture promotes transparency in public administration by creating and implementing complexes of information systems that integrate various databases, thereby, enhancing the efficiency and effectiveness of e-government operations. The e-government system can be accessed online through government websites and the Unified Portal of Interactive Public Services and offline via Public Service Centres located in every district. The Portal serves 10.3 million citizens and provides 735 services, of which 534 are available through mobile application.

Figure 1 demonstrates the improvement of Uzbekistan's ranking in the E-Government Survey 2024 to 63rd position (out of 193 countries) in e-government development as compared to 69th in 2022 and 87th in 2020 (UN DESA, 2024).

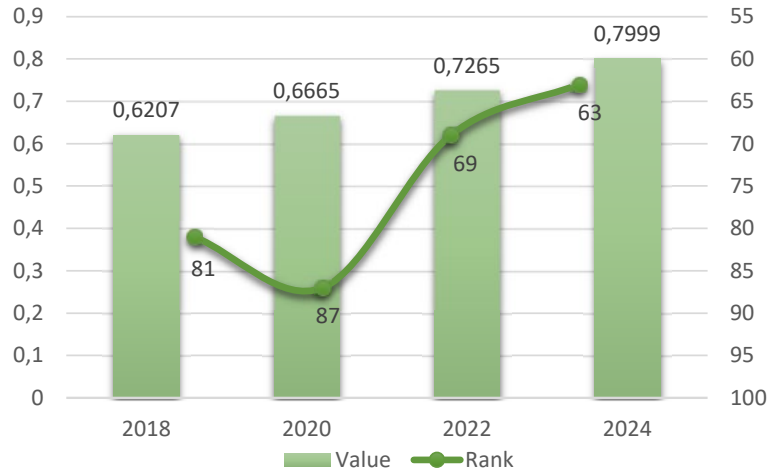


Figure 1. Uzbekistan rank and value in the E-Government Development Index

Source: UN E-Government Knowledgebase

Uzbekistan's e-government system has significantly improved the efficiency, accessibility and transparency of public services through the adoption of digital platforms like the Unified Portal of Interactive Public Services (my.gov.uz) and various e-participation tools. Citizens can actively participate in governance via specialized platforms: regulation.gov.uz (for policy feedback) and openbudget.uz (for fiscal transparency), fostering a more inclusive and participatory governance model.

In 2024, Uzbekistan ranked 53rd out of 193 countries (score: 0.698) in the E-Participation Index of the United Nations E-Government Survey which measures digital public engagement. The score reflects the country's progress in enabling citizens and businesses to access public information online, participate in e-consultations and engage in e-decision-making through official e-government portals and websites (UN DESA, 2024).

The State Committee of the Republic of Uzbekistan on Statistics maintains the Open Data Portal of the Republic of Uzbekistan, which integrates 10,408 datasets from 159 organizations. According to the Open Data Inventory (ODIN), in 2024 Uzbekistan ranked first in Central Asia and 12th among 198 countries, which was an impressive ascent from 168th (out of 178) in 2018 and 30th (out of 195) in 2023.

Digital Economy and ICT Infrastructure

In recent years, Uzbekistan has implemented extensive reforms to accelerate transition towards a digital economy. The President and the Government have enacted numerous legislative acts, executive decrees, strategic plans and dedicated programmes to advance digital transformation and foster economic growth. In 2018, President Shavkat Mirziyoyev outlined a vision to expand the digital economy's share of GDP to 30%, a goal driven by sustained reforms and proactive initiatives (The Permanent Mission of the Republic of Uzbekistan to the UN, 2018).

These efforts have led to the growth of the digital economy: in 2023, the share of gross value added (GVA) generated by the ICT sector accounted for 2.24% of Uzbekistan's GDP.[23] The number of enterprises and organizations registered under the information and communication category increased between 2020 and 2024 from 7,901 to 10,551, of them 1,602 enterprises were active in computer programming, 1,223 in wireless communication, 604 in data processing and hosting and 583 in consulting services in the field of computer technology.[24] Within the same period, the number of employees in the ICT sector grew from 58.7 thousand people to 96.3 thousand people.[25]

Penetration of digitalization between 2019 and 2023, as reflected in the share of GVA in GDP, can be traced in the increase of the following subsectors: e-commerce from 0.05% to 1.23% and ICT services (communication, computer programming, consulting, data processing and hosting, operating web portals, repairing computers and communication equipment, developing software, etc.) from 1.34% to 2.07%.[26] The Government of Uzbekistan promotes digitalization in the banking and financial sector. In 2019, the Law of the Republic of Uzbekistan "On Payments and Payment Systems" was adopted to regulate, among other things, the use of electronic money and payment systems which facilitated the growth of digital financial services and accelerated the modernization and integration of the ICT sector into the broader digital economy. Several banks in Uzbekistan have launched mobile banking applications that enable customers to access banking services from mobile devices.

The rapid expansion of the technological ecosystem, driven by the government initiatives, contributes to the steady growth of export potential in the ICT sector. The country's high-technology exports as percentage of manufactured exports doubled from 1.4% in 2022 to 2.8% in 2023.[27] The ICT goods exports as percentage of total trade tripled from 0.16% in 2021 to 0.53% in 2022, then increased considerably to 0.85% in 2023.[28] The ICT services exports as percentage of total trade in services experienced fluctuations: the peak of 9.54% was reached in 2020 and the decline to 5.16% observed in 2022 was followed by

[23] National Statistics Committee of the Republic of Uzbekistan. 2023. Open Data. https://stat.uz/en/official-statistics/national-accounts

[24] National Statistics Committee of the Republic of Uzbekistan. 2024. Open Data. https://stat.uz/en/official-statistics/tsifrovaya-ekonomika-eng

[25] National Statistics Committee of the Republic of Uzbekistan. 2024. Open Data. https://stat.uz/en/official-statistics/labor-market

[26] National Statistics Committee of the Republic of Uzbekistan. 2023. Open Data. https://stat.uz/en/official-statistics/national-accounts

[27] World Bank. 2018–2023. World Development Indicators: High-technology exports (% of manufactured exports). Uzbekistan. https://databank.worldbank.org/reports.aspx?dsid=2&series=TX.VAL.TECH.MF.ZS

[28] UNCTAD. 2023. Data Hub. Share of ICT goods as percentage of total trade, annual. Uzbekistan. https://unctadstat.unctad.org/datacentre/dataviewer/US.IctGoodsShare

the rebound to 7.62% in 2023.[29] The volume of ICT services exports increased significantly between 2021 and 2023 from 165 million USD to 390 million USD.[30]

Over the past years, Uzbekistan has implemented a series of measures to foster the competitiveness of ICT products and services in both domestic and international markets. In 2017, IT companies were granted value-added tax relief on imported services, corporate tax relief and reduced personal income tax rates (Government of the Republic of Uzbekistan, 2017). The Resolution of the President of the Republic of Uzbekistan No. PP-87 On Additional Measures to Promote the Export of Services in the Field of Digitalization in the Country (26 February 2024) introduced export-boosting mechanisms to strengthen IT service exports and digitalization, including initiatives such as the Zero Risk and Local2Global.

In 2019, the Government established the Technological Park of Software Products and Information Technologies (IT Park), providing residents with modern infrastructure and support services, including financial, legal, marketing and business acceleration (Government of the Republic of Uzbekistan, 2019). IT Park facilitates academia–industry collaboration by offering a platform for talented IT specialists to develop innovative concepts into viable business projects. In 2024, the Presidential Decree extended the tax and customs incentives for high-performing IT Park residents (generating over 50% of their revenue from exports) and the educational institutions whose graduates are employed by these export-oriented enterprises from 2028 through 2040 (Government of the Republic of Uzbekistan, 2024b). In December 2024, IT Park Uzbekistan launched the Digital Startups Programme aimed at strengthening Uzbekistan's innovation ecosystem and supporting the development of promising technologies. The programme was designed to attract investments, ensure compensation of expenses for participation in international accelerators, deliver entrepreneurship training and support intellectual property patenting (IT Park, 2024a). From January to May 2025, IT Park Uzbekistan welcomed 636 new residents, of which 280 were export-oriented companies. The growing number of export-oriented IT Park residents and the increasing foreign capital underscore the confidence of international investors and enterprises and reflect their sustained interest in the country as an emerging global IT hub (MDT, 2025c).

The country aims to harness the potential of artificial intelligence. According to UNDP study, 57.9% of private sector companies have integrated AI into their operations, mainly into content creation, sales and customer engagement. The shortage of skilled personnel, data quality issues and high implementation costs are mentioned as the key challenges for AI adoption in the private sector. Despite these challenges, 79.9% of companies plan to expand AI use in 2026, focusing on sales and marketing, though 52.6% plan to invest less than 10,000 USD (UNDP, 2025).

Uzbekistan has recently made significant progress in enhancing ICT infrastructure by allocating substantial resources in line with the "Digital Uzbekistan — 2030" strategy. According to the ICT Development Index (IDI) 2024, the country improved its standing, with the IDI score increasing from 81.7 in 2023 to 84.9 in 2024 (ITU, 2024). MDT is implementing large-scale initiatives to strengthen internet connectivity and affordability,

[29] UNCTAD. 2023. Data Hub. International trade in ICT services, value, shares and growth, annual. Uzbekistan. https://unctadstat.unctad.org/datacentre/dataviewer/US.TradeServICT

[30] UNCTAD. 2023. Data Hub. International trade in ICT services, value, shares and growth, annual. Uzbekistan. https://unctadstat.unctad.org/datacentre/dataviewer/US.TradeServICT

to expand broadband access, to lay fibre optic lines, to develop mobile networks and other telecommunications services, to build data centre and cloud infrastructure, etc. (MDT, 2024b).

The extension of the fibre optic network plays a critical role in driving improvements in connectivity infrastructure. The "Digital Uzbekistan — 2030" strategy envisions the increase from 118,000 km to 250,000 km by 2030, which would ensure 100% coverage by high-speed internet. In 2022, the length reached 170,000 km providing approximately 80% of settlements with access to high-speed communication services (MDT, 2024b).

In 2023, approximately 89% of the population had access to the internet with 96.2% of households connected at home (ITU, 2023). In 2024, the number of internet subscribers reached 30.1 million people, reflecting a 12.5% growth compared to the previous year. Over 6.3 million users were registered in Tashkent (National Statistics Committee of the Republic of Uzbekistan, 2024). Between 2018 and 2023, the upward trend was observed in fixed broadband subscriptions and in active mobile-broadband subscriptions: from 12.7 to 30.3 million people and from 20.3 to 38 million people, respectively. In 2023, 99.5% of the population had access to 2G, while 96% and 92% could connect to 3G and 4G networks, respectively. The 5G roll-out is still limited to Tashkent and regional IT parks and covers 18% of the population (ITU, 2023).

Table 4. Selected ICT connectivity and affordability indicators

Individuals using the Internet (%)	89
Households with internet access at home (%)	96.2
Mobile broadband subscriptions per 100 inhabitants	107
Percentage of the population covered by at least a 3G mobile network	96.0
Percentage of the population covered by at least a 4G/LTE mobile network	92.0
Mobile broadband internet traffic per mobile broadband subscription (GB)	76.6
Fixed broadband internet traffic per fixed broadband subscription (GB)	556
Mobile data and voice high consumption basket price (as % of GNI per capita)	1.2
Fixed broadband internet basket price (as % of GNI per capita)	4.09
Individuals who own a mobile phone (%)	82.2

Source: ITU[31]

Mobile internet remains the primary — and often the only — source of internet access for many people in Uzbekistan, particularly those living in rural areas (UNDP, 2022a). The predominance of mobile internet has been amplified by the consistent decline in mobile service prices since 2017, which contributed to the growth of social media usage. Between 2024 and 2025, the number of active social media users increased from 8.7 to 11.7 million people, representing 24.6% and 31.7% of the total population, respectively (DataReportal, 2025).

Uzbekistan ranks 61st out of 100 countries in the Inclusive Internet Index. In terms of internet access, the country ranks 72nd, with a 13.3% difference in access rates between men and

[31] ITU. 2023. ITU DataHub. Uzbekistan. https://datahub.itu.int/data/?e=UZB

women. Uzbekistan ranks 83rd for mobile phone access, with a 9.6% gap favouring male ownership (Economist Impact, 2022). These disparities point to the challenges women encounter due to cultural traditions, digital literacy and affordability issues.

Uzbekistan's data processing and storage capacity relies on the operation of three data centres based in Tashkent (MDT, 2024b). To overcome the barrier of the shortage of high-performance computing infrastructure required for advanced AI applications, the Government plans to establish the Centre for the Development of Artificial Intelligence and the Digital Economy within the framework of the Strategy for the Development of Artificial Intelligence Technologies. Establishment of high-efficiency AI data centres and implementation of AI projects is supported by strategic partnerships with Saudi Arabia and the United Arab Emirates (UzDaily, 2024; MDT, 2024c).

Uzum — Uzbekistan's leading digital ecosystem — integrates e-commerce, fintech and banking services for individuals and SMEs (marketplace, express delivery, traditional and digital banking, BNPL services, a car purchase platform, an app for entrepreneurs). The platform serves over 15 million monthly users and employs 11 thousand people, including top-tier IT professionals, which highlights the growing scale and capabilities of the country's digital economy.

Human Capacity for Digital Economy: Knowledge, Skills and Employability

Human capital is key to digital transformation: the successful implementation of ambitious strategies and programmes in the field of digitalization depends on the availability of human resources with advanced knowledge and skills in digital technologies.

The "Digital Uzbekistan — 2030" strategy prioritizes IT education, establishing measurable targets for digital literacy enhancement across all levels of education. The strategy identified the following priorities in the field of education: the introduction of public subsidies to cover fees for international IT certification; the establishment of training centres aimed at enhancing digital competencies among the general population, particularly youth and women. Presidential Decree No. PP-4851 On Measures for the Further Improvement of the Education System in the Field of Information Technology, Development and Integration of Scientific Research with the IT Industry (October 6, 2020) regulates the revision of curriculum and schedule of advance professional training, national teacher certification system, the launch of IT talent portal and the establishment of higher educational institutions, scientific and innovation centres across the country. According to UNDP, 550 IT centres have been established across Uzbekistan, with 70% located in regional areas (UNDP, 2025).

ITU data on ICT skills in Uzbekistan indicates that advanced digital competencies remain an area with considerable potential for further development. In 2023, almost 45% of individuals used copy-and-paste tools, while proficiency in more complex skills remained low: 16.2% were able to operate with basic spreadsheet formulas, 6.33% — to create presentations and only 2.6% — to write computer programmes. Digital security awareness was low: only 9.07% of individuals reported setting up effective security measures to protect devices and accounts, while just 2.6% reported changing privacy settings on devices or apps. Gender disparities persisted: only 1.2% of females and 1.6% of males could change privacy settings. As to ICT problem-solving skills, 14.9% of individuals reported connecting and installing new devices, 8.35% of individuals could transfer files between computers and other devices and 7.55% engaged in finding, downloading, installing and configuring software.[32] Specific gaps included basic digital skills (23%), standard digital skills (21%) and advanced digital skills (26%) (UNDP, 2022a). This data suggests the need to develop educational and training programmes in order to improve digital skills, in particular, cybersecurity and problem-solving skills. According to the ITU, internet usage among individuals aged 15 to 24 in Uzbekistan reached 93.9% in 2022[33] and 75.6% of individuals in this age group reported using a computer.[34] As of January 2025, 11.7 million people (31.7% of the total population) were active social media users, among them 10.3 million users aged 18 and above (43.8% of the total population of this age cohort). The pool of social media user identities increased by three million (+33.9%) between early 2024 and the beginning of 2025. About 32% of the users were female, while 68% were male (DataReportal, 2025).

[32] ITU. 2023. ITU DataHub. Country profile: Uzbekistan. https://datahub.itu.int/data/?e=UZB

[33] ITU. 2022. ITU DataHub. Individuals using the Internet. Uzbekistan Country Data. https://datahub.itu.int/data/?e=UZB&c=701&v=chart&i=11624&d=Age

[34] ITU. 2022. ITU DataHub. Individuals using a computer. Uzbekistan Country Data. https://datahub.itu.int/data/?e=UZB&c=701&v=chart&i=11485&d=Age

Higher education and ICT training

The Decree of the President of the Republic of Uzbekistan No. DP-5847 of October 8, 2019 On Approval of the Concept for the Development of the Higher Education System of the Republic of Uzbekistan until 2030 outlines a range of measures aimed at establishing a robust training system for highly qualified engineering and technical specialists to meet the needs of the digital economy. These include creating enabling conditions for the effective integration of modern ICT and educational technologies; promoting the continuous professional development of teaching staff; and advancing the personalization of learning through digital tools. The Concept supports the development of distance education, the implementation of webinar-based instruction, online and blended learning models, including the 'flipped classroom' approach, as well as the delivery of remote learning programmes. The Decree stipulates the establishment of technoparks, foresight centres, technology transfer centres, start-ups and accelerators within HEIs. This is to be achieved through the broad attraction of foreign investment, the expansion of paid services and the mobilisation of other extrabudgetary resources.

The Government of Uzbekistan allocates substantial public investments and implements relevant policy initiatives. According to UNESCO Institute for Statistics (UIS), total government expenditures on education amounted to 5.47% of GDP in 2023, the share of expenditures on tertiary education was 0.48% of GDP.[35] In 2023, the share of budget expenditures on education reached 22.6% of total state budget expenditures and the indicator is projected to increase to 24.9% by 2027 (Senate of the Oliy Majlis of the Republic of Uzbekistan, 2022; Ministry of Economy and Finance of the Republic of Uzbekistan, 2025).

The adoption of presidential and government decrees aimed at enhancing inclusion and equity in higher education (HE) resulted in a significant rise in the number of HEIs and enrolled students. According to the National Statistics Committee, between 2017 and 2024, the number of HEIs increased from 72 to 222 (foreign HEIs operating in Uzbekistan — from 7 to 31). Information Technology (IT) education is growing, with 21 universities and 14 foreign-affiliated programmes offering ICT degrees (UNDP, 2025). The number of enrolled students quadrupled from 297,689 in 2017 to 1,314,542 in 2023. The number of male and female students in HEIs is almost equal (657,925 and 656,617, respectively). In 2023, among 184,133 HEI graduates 46% (84,721) were females and 54% (99,412) were males. The largest share of graduates was from Tashkent city (30%) followed by Fergana region (9%), Samarkand region (8%), Republic of Karakalpakstan (7%), Bukhara region (6%), Tashkent region (6%) and Andijan region (6%).[36]

ICT infrastructure of higher education institutions has been enhanced in the course of implementation of the "Digital Uzbekistan — 2030" strategy. HEIs have been equipped with 195 modern servers, while the internet speed has been upgraded from 50 Mbps to 1 Gbps, ensuring faster access to digital resources and enhancing both learning and administrative processes.[37]

[35] UIS. 2023. UIS Data Browser. Government expenditure on education, as a percentage of GDP — Uzbekistan. https://databrowser.uis.unesco.org/

[36] National Statistics Committee of the Republic of Uzbekistan. 2024. Open Data. Higher education. https://stat.uz/en/official-statistics/social-protection

[37] Ministry of Higher Education, Science and Innovations of the Republic of Uzbekistan. 2020. Statistics. https://edu.uz/uz/pages/sss#gsc.tab=0

The Decree of the President of the Republic of Uzbekistan No. DP-5953 On the State Programme for the Implementation of the Action Strategy for the Five Priority Areas of Development of the Republic of Uzbekistan in 2017-2021 in the "The Year of Development of Science, Education and the Digital Economy" (March 2, 2020) provides for the revision of curricula in the field of ICT and digital economy, organizing training in data science, big data and AI; as well as submission of proposals to the Cabinet of Ministers on the creation of an incentive system for obtaining international IT certificates.

The Higher Education Management Information System (HEMIS) implemented across all public HEIs in Uzbekistan enables the generation, management and storage of student-related data to support academic and research activities, while optimizing administrative and financial operations.[38] The adoption of HEMIS aims to enhance operational efficiency, improve data-driven decision-making and streamline university governance. HEMIS Mobile App allows students to conveniently access the Higher Education Management Information System via their mobile devices. In 2025, the Ministry of Higher Education, Science and Innovations plans to launch a digital ecosystem and a unified DATAHUB to centralize and optimize data management across all information systems (Ministry of Higher Education, Science and Innovations of the Republic of Uzbekistan, 2023). Currently, the cluster of national online portals includes online application platform for job vacancies (vacancy.edu.uz), a database of diplomas of higher, secondary specialized and professional educational institutions (diplom.edu.uz), a unified electronic system for post-higher education (phd.mininnovation.uz) and the National Science Portal (nsp.gov.uz).

The number of graduates in Science, Technology, Engineering and Mathematics (STEM) programmes in tertiary education increased from 31.51% in 2017 to 34.48% in 2019, then dropped to 32.79% in 2021.[39] Since 2018–2020, when the share of female STEM graduates was about 21%, the indicator rose to 22.50% in 2020 before declining to 17.53% in 2021.[40] Over the past four years, the number of HEI students in "Computer Technologies and Informatics" and "Communications, Informatization and Telecommunication Technologies" has increased, with more students coming from the "Computer Technologies and Informatics". In 2020–2021, the share of female graduates in "Computer Technologies and Informatics" was only 14%, while in "Communications, Informatization and Telecommunication Technologies" the share was about 26% (UNDP, 2022b). According to UIS, the percentage of graduates from the tertiary education programmes who specialized in ICT was gradually growing from 3.85% in 2017 to 4.60% in 2019 and 4.83% in 2021 (Fig. 2).[41]

[38] Ministry of Higher Education, Science and Innovations of the Republic of Uzbekistan. 2020. Statistics. https://edu.uz/uz/pages/sss#gsc.tab=0

[39] UIS. 2021. Percentage of graduates from STEM programmes in tertiary education, both sexes (%). Uzbekistan. https://databrowser.uis.unesco.org/

[40] UIS. 2021. Percentage of graduates from STEM programmes in tertiary education, female (%). Uzbekistan. https://databrowser.uis.unesco.org/

[41] UIS. 2021. Percentage of graduates from tertiary education graduating from ICT programmes, both sexes (%). Uzbekistan. https://databrowser.uis.unesco.org/

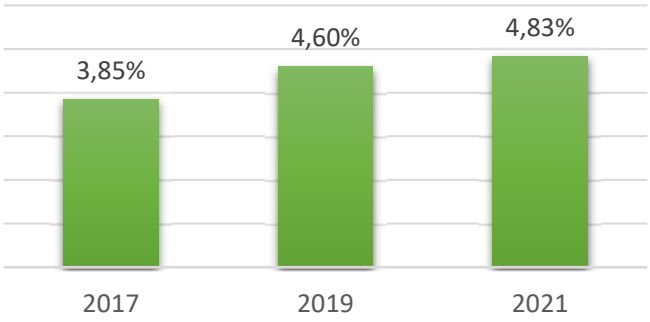


Figure 2. Share of graduates from ICT programmes in tertiary education (%). Source: UIS

In 2025, two Uzbekistan universities were included in the QS World University Rankings: the National Research University — Tashkent Institute of Irrigation and Agricultural Mechanization Engineers (TIIAME) was ranked 547th and the National University of Uzbekistan named after Mirzo Ulugbek (Tashkent) was attributed to 781-790th category. In total, 23 Uzbekistan HEIs are presented in the QS Rankings by region "Central Asia", among them TIIAME (7th), the National University of Uzbekistan named after Mirzo Ulugbek (12th), Tashkent State University of Economics (23rd), Tashkent State Technical University (24th), Samarkand State University (30th) and Tashkent University of Information Technologies named after Muhammad Al-Khwarizmi (TUIT) (34th). Three Uzbekistan universities are listed in the Times Higher Education World University Rankings 2025: TIIAME — 601-800th, the National University of Uzbekistan named after Mirzo Ulugbek — 1001-1200th and TUIT — 1501+.

Tashkent University of Information Technologies named after Muhammad al-Khwarizmi (TUIT) is a leading higher educational institution in Uzbekistan, renowned for training IT specialists. With an enrolment exceeding 27,000 students across the main campus and five regional branches, TUIT plays a pivotal role in shaping the country's IT talent. The University's core academic portfolio comprises 18 undergraduate programmes and 30 master's specializations, including the programme "Digital Technologies and Artificial Intelligence". The regional branches provide education in seven undergraduate programmes and six master's specializations, ensuring accessibility of quality IT education nationwide. In 2021 and 2022, 7,438 students graduated from TUIT and its regional branches, of whom 88.6% had secured employment (MDT, 2025a).

The National University of Uzbekistan named after Mirzo Ulugbek (NUUz) offers a variety of ICT programmes across several departments: Department of Software Engineering and Artificial Intelligence, Computational Mathematics and Information Systems, Information Security, Applied Mathematics and Computer Analysis.

Training in ICT and AI is also provided by foreign and private HEIs: Inha University and Bucheon University in Tashkent (Republic of Korea), Westminster International University in Tashkent (UK), Turin Polytechnic University in Tashkent (Italy), Webster University Tashkent (USA) and Amity University (India). Inha University was founded in 2014 in cooperation with the Inha University in the Republic of Korea. It conducts teaching in English and offers undergraduate programmes in Computers & Software Engineering and Logistics & Business Management, as well as MBA in Digital Transformation. The number of students exceeds 1,720 (MDT, 2025a). Amity University (Tashkent) launched operations during the 2019/2020 academic year with a mission to develop highly skilled ICT professionals. The University offers five undergraduate

programmes and one master's programme. The number of enrolled students is over 900 (MDT, 2025a).

The first university in the country offering hands-on IT education in a hybrid format, the IT Park University (ITPU), was established in 2022 under the Ministry of Digital Technologies of Uzbekistan. ITPU bachelor's and master's programmes in Software Engineering, Cybersecurity, Information Security and AI are aligned with the evolving needs of the labour market.

In the 2023/2024 academic year, the branch campus of India's Acharya University commenced operations in Karakul District, Bukhara Region. The University offers programmes in Cloud Computing, Computer Science, Database Operations and Cybersecurity.

Opened in 2025, the Cyber University offers modern education in the field of information technology. The programme specializations include Cyber Law, Information Security, Software Cybersecurity and Computer Engineering, Digital Economy, etc.

In addition to specialized IT universities, other higher education institutions offer IT programmes, among them Tashkent State Technical University, Tashkent State University of Economics, Samarkand State University, Termez State University, New Uzbekistan University.

Uzbekistan has become the first country in Central Asia to implement UNESCO's Education Management Information System Progress Assessment Tool for Transformation (EMIS-PATT) to strengthen the national education data system, to support evidence-based decision making and enhance the administration and monitoring of the education sector (Daryo, 2025).

In accordance with the Decree of the President of the Republic of Uzbekistan No. RP-191 On the Creation of a Public Educational Information Network of the Republic of Uzbekistan (September 28, 2005), the public educational information and resource network ZiyoNET ("ziyo" means "enlightenment" in Uzbek) was created in 2006. ZiyoNET unites information materials and resources intended for educational, scientific, youth and children's institutions and organizations. The portal has reached over 136,000 users, of which 47,955 are regular users. The wealth of content is represented by a library with 119,608 educational resources, 8,274 audiobooks, information on 17,925 educational institutions and 5,455 educational websites.

In 2023, the Mentalaba.uz platform was established, offering comprehensive information on all educational institutions in Uzbekistan, along with university admissions and resources for career advancement, thereby fostering lifelong learning and supporting progress in both academic and professional domains.

Educational initiatives and certification programmes

In addition to formal education, a broad range of initiatives and certification programmes have been implemented by governmental, nongovernmental and international organizations to enhance digital capacity and expand access to ICT education in Uzbekistan. IT Park is one of the prominent actors in this field. Its programmes include free and paid courses: Digitalization and the Basics of IT Entrepreneurship, One Million Uzbek Coders, Computer Literacy, eSports, Mobile

Robotics, Graphic and Web Design, Front-End Development, English for Programmers, Back-End Development.

The first phase of the One Million Uzbek Coders project, launched in collaboration with the United Arab Emirates, was implemented in 2019–2022: out of 2,503,060 students who registered for the One Million Uzbek Coders programme 1,557,977 received participation certificates, 1,175,933 received certificates of completion; 90% of the total number of participants were schoolchildren, 47% were girls (IT Park, 2022). In the second phase of the project (2023–2024), over 960,000 users registered with 420,000 completing free courses and 2,900 earning international professional IT certifications through the Coursera platform (MDT, 2025a). Uzbekistan ranked first globally for the proportion of workforce, including civil servants, engaged in online skills development on Coursera (Coursera, 2024).

The Future Skills Uzbekistan project, launched jointly by IT Park and the Ministry of Employment and Labour Relations in 2021, was aimed to improve the system of vocational education in IT and to increase the number of highly qualified IT specialists through a comprehensive training programme.

Since 2021, the Ministry of Economic Development and Poverty Reduction of the Republic of Uzbekistan and UNDP have implemented the Empowering the Youth to Embrace the Digital Economy and Digital Entrepreneurship project to enhance digital skills of young entrepreneurs, to create entrepreneurship environment and strengthen institutional capacities for developing digital economy and digital entrepreneurship policies with a focus on youth employment.

The initiative approved by the Resolution of the President of the Republic of Uzbekistan (No. RP-51) envisions measures to support youth in acquiring internationally recognized IT certifications: reimbursement of up to 60% of the costs for training and certification and 100% to those with a B2 or higher level of English proficiency (Government of the Republic of Uzbekistan, 2024). In addition to expanding access to the global IT qualifications and credentials, the initiative encourages the enhancement of English language proficiency and mastering advanced knowledge and skills in digital technologies for in-demand IT service export roles.

The IT Talents Programme introduces a subsidy system for private IT education companies: if graduates are employed by companies exporting IT services, the subsidy amounts up to 75 times of the basic calculation rate; in case graduates with disabilities are employed, the subsidy covers up to 105 times of the basic calculation rate (Government of the Republic of Uzbekistan, 2024). During the ICT Week 2024, a training centre from the Khorezm region was awarded the first subsidy for training six highly skilled specialists whose qualifications met the demands of the export-oriented IT companies (MDT, 2025a).

The Ministry of Employment and Poverty Reduction of the Republic of Uzbekistan has established a national system for retraining specialists with IT skills, which includes special IT courses designed for unemployed citizens (Goyipnazarov, 2023).

Uzbekistan implements a comprehensive programme to train youth for participation in prestigious international Olympiads, competitions and contests in the field of IT. Uzbekistan national team secured three bronze medals in the International Olympiad

in Informatics (IOI): 2023[42] and 2024[43]. In 2024, Uzbekistan national team participated in the European Girls' Olympiad in Informatics for the first time and earned a bronze medal.[44] The IOI 2026 will be hosted in Uzbekistan (MDT, 2023; Uzbekistan National News Agency — UZA, 2024).

To further align learning outcomes with labour market needs and enhance employability in the ICT industry, the Ministry of Digital Technologies fosters collaboration between academia and the private sector.

The joint UNESCO–UNICEF project "Empowering Education in Uzbekistan: Leveraging ICT and Digital Learning for High-Quality and Inclusive Education Results" implemented under the Uzbekistan Vision 2030 Fund ISHONCH aims to bridge the digital divide and improve education quality, particularly in rural and marginalized areas. Major initiatives include establishing a national teacher education policy, developing an ICT competency framework and creating training modules to enhance digital skills (UNESCO, 2025).

The ADB-funded project "Programme Skills Development for a Modern Economy of Uzbekistan" (2021–2024), implemented jointly by the Ministry of Employment and Labour Relations and the Ministry of Higher and Secondary Specialized Education, aimed to support and expand market-driven skills development through professional training centres and technical and vocational education colleges (ADB, 2020).

Research and development in ICT and AI

Uzbekistan's activity in the structural development of AI has been identified as one of the country's priority areas. "Digital Uzbekistan — 2030" and the Presidential Resolutions On Measures for Creating Conditions for the Accelerated Introduction of Artificial Intelligence Technologies No. PP-4996 of February 17, 2021 and On Measures to Introduce a Special Regime of Application of Artificial Intelligence Technologies No. PP-5234 of August 26, 2021 establish the framework for the accelerated introduction of AI technologies and their widespread use, ensuring the availability and high quality of digital data and training qualified personnel in this field. The Strategy for the Development of Artificial Intelligence Technologies until 2030 aims to create the conditions for the introduction of AI technologies in the social sphere and economic sectors. It defines the objectives and priority areas for the broad application and rapid development of AI in Uzbekistan, based on the analysis of global trends and best practices.

Particular attention is being paid to the creation of the integrated infrastructure for the development of AI. The Digital Technologies and Artificial Intelligence Development Research Institute set up by MDT conducts research and development in the field of AI, building a scientific ecosystem for the development of digital technologies (Abduvaliev, 2025). The main fields of research include Biometric Systems, Pattern Recognition, Natural Language Processing, AI and Machine Learning, Intelligent Software Systems, Modelling of Complex Systems, Control and Digital Design of Technical Systems, Smart Systems and Internet of Things.

[42] The International Olympiad in Informatics. 2023. The final results of IOI 2023. https://ioi-2023.github.io/
[43] The International Olympiad in Informatics. 2024. The final results of IOI 2024. https://ioi-2024.github.io/
[44] The European Girls' Olympiad in Informatics. 2024. Results. https://stats.egoi.org/editions/2024/results/

The Artificial Intelligence and Information Technologies Laboratory at the Institute of Fundamental and Applied Research is a leading research centre specializing in the development and implementation of advanced AI technologies. The Laboratory provides young researchers and students with training and development programmes to prepare the next generation of experts for careers in AI research and industry. The Laboratory engages in a wide range of research in the following key areas: Machine Learning and Deep Learning, Computer Vision, Natural Language Processing, Robotics, Distributed Systems and Computing, AI Ethics and Safety.

A series of initiatives have been implemented to improve research capacity and HEI management since 2017. However, as concluded in the World Bank publication, the quality of higher education requires improvement, particularly in terms of faculty qualifications and research output; there is a lack of emphasis on research; cooperation with other Central Asian countries remains limited (Ambasz et al., 2023).

Based on the official data of the National Statistics Committee, the public funding of scientific research in Uzbekistan increased from 336.5 billion UZS (41.71 million USD) in 2018 to 1,379.7 billion UZS (124.85 million USD) in 2022.[45] In 2023, a total of 107 scientific research projects valued at approximately 20.23 billion UZS (1.72 million USD) were conducted at the TUIT and its regional branches (TUIT, 2024).[46]

According to the Ministry of Innovative Development, 43 scientific projects related to the field of ICT were planned in Uzbekistan from 2019 to 2026 (UNDP, 2023).

Uzbekistan's progress in AI education and research is supported by 16 HEIs offering AI programmes in 2025, compared to just four a few years ago. The number of doctoral programmes in AI has grown, yet a critical skills gap persists, impeding widespread AI adoption across both public and private sectors (UNDP, 2025). According OECD.AI Policy Observatory, Uzbekistan's contributions to the public AI projects and project impact (measured by commits) increased from 48 in 2020 to 348 in 2023.[47]

Labour market and demand for ICT talent

Government initiatives to accelerate digital transformation and strengthen ICT human capital are reshaping the labour market and employment structure in Uzbekistan. Between 2020 and 2024, the ICT sector has demonstrated an upward trend: the number of enterprises and organizations registered under the information and communication category increased from 7,901 to 10,551 and the number of employees in the ICT sector grew from 58.7 thousand people to 96.3 thousand people.[48] The IT Park has become a catalyst for the expansion of the ICT sector workforce. In 2024, IT Park resident companies

[45] National Statistics Committee of the Republic of Uzbekistan. 2022. Social sphere: Science and innovations. Volume of scientific research work. https://api.siat.stat.uz/media/uploads/sdmx/sdmx_data_3454.pdf. USD equivalents are calculated by the author using the average annual exchange rates from the World Bank. https://data.worldbank.org/indicator/PA.NUS.FCRF?locations=UZ

[46] USD equivalents are calculated by the author using the average annual exchange rates from the World Bank. https://data.worldbank.org/indicator/PA.NUS.FCRF?locations=UZ

[47] OECD. 2023. OECD.AI Policy Observatory. AI in Uzbekistan. AI Software Development (All AI projects). Contributions to public AI projects and project impact. Visualization powered by JSI, using data from GitHub. https://oecd.ai/en/dashboards/countries/Uzbekistan

[48] National Statistics Committee of the Republic of Uzbekistan. 2024. Open Data. Distribution of the employed population by type of economic activity. https://stat.uz/en/official-statistics/labor-market

employed a total of 26,017 professionals, predominantly in Tashkent 22,376 (86%) and in regional areas 3,641 (14%) (IT Park, 2024b).

Being one of the top three fastest-growing industries in terms of self-employment, the IT sector grew by 83% since 2024. In 2025, the number of self-employed IT workers amounted to 145.7 thousand, making up 2.9% of the total 5.1 million self-employed workforce (Tax Committee of the Republic of Uzbekistan, 2025).

Reflecting global trends and evolving business needs, online employment, remote and flexible forms of work become popular. Remote work in Uzbekistan is regulated by the Labor Code, which outlines the general principles and requirements for establishing employment relationships. Digital platforms, such as Upwork, Worklance, Jobo.uz, Freelance.uz, Uzum, UzFreelance, Giglancer, 2Work and others, provide employment opportunities regardless of the region of residence. This is especially relevant for young people and women in regions with limited access to traditional jobs. Remote employment is becoming the new standard, especially in the service, education and marketing sectors. Through mobile finance, cryptocurrency, gig work and digital startups young people are building flexible and entrepreneurial career pathways (Boymurodov, 2025).

As reported by the World Bank, the national economy creates an average of 280,000 new jobs annually, while over 600,000 graduates enter the labour market each year. This imbalance forces numerous qualified candidates into informal, low-skilled employment, highlighting mismatch between educational outputs and evolving labour market requirements. Employers report significant skill gaps among highly educated employees, particularly in digital literacy and foreign language proficiency (Ambasz et al., 2023). The high demand coupled with a shortage of experienced professionals, particularly senior specialists, is a challenge for employers. According to 2021 IT Park survey, 62% of companies faced difficulties in hiring IT specialists related to a lack of qualified candidates, insufficient practical experience, high salary expectations and high staff turnover (UNDP, 2025).

The HH.uz platform listed 130,000 active vacancies during 2024, representing a 28% year-on-year increase. Programmers and developers were the most in-demand vacancies in Uzbekistan's IT sector in 2023. They accounted for 31% of the total number of vacancies in HH.uz (Kursiv, 2024). As of June 2025, the highest demand was observed for developers and programmers, computer designers and technical support specialists, IT analysts, project managers, system administrators, testers and information security experts. A growing demand was noticed for programmers/developers, designers, project managers, technical support specialists, product managers, system administrators, testers, analysts, business intelligence analysts and data analysts.

According to 2022 IT Park survey, women made up 16.8% of IT Park employees in Uzbekistan's IT sector (UNDP, 2023). The low female participation in IT sector is due to cultural and societal challenges rather than institutional barriers preventing women from entering the field. To bridge the gender gap in Uzbekistan's growing tech industry, IT Park — with support from the Government and international organizations — has launched a series of initiatives, including Women in Tech, Skills4Girls, GAP–IT Club for Women and the Digital Internship Programme (IT Park, 2023).

The Future of Jobs Report 2025 states that the fastest-growing IT jobs by 2030 will be driven by AI adoption, data analytics and automation. These include Big Data Specialists,

FinTech Engineers, AI and Machine Learning Specialists and Software and Applications Developers, Security Management Specialists, Data Warehousing Specialists, UI and UX Designers, Internet of Things Specialists, Data Analysts and Scientists, Information Security Analysts, etc. (World Economic Forum, 2025). Specifically for Uzbekistan, the Report predicts that "addressing skills gaps in the labour market is identified as a primary challenge to business transformation over the 2025 to 2030 period. While 71% of employers in the country expect improvements in talent retention, significantly above the global average, there remains strong need for reskilling and upskilling the current workforce." Only 22% of Uzbekistan's workforce is expected to be able to upskill in their current role, with an additional 14% projected to be upskilled and then re-deployed. More than half of employers anticipate implementing strategies for reskilling their workforce. Skills such as programming, teaching and mentoring and multilingualism have higher-than-global projected demand increases (World Economic Forum, 2025).

Conclusions and Recommendations

Uzbekistan's progress in fostering innovation and advancing digital economy is largely due to the adoption of the government strategies and consistent implementation of targeted programmes. Continued investments in digital infrastructure, software and advanced technology solutions enabled considerable improvements in ICT coverage and affordability, internet penetration, digital participation and inclusion. The major achievements include strengthened e-governance and widespread adoption of e-services. Comprehensive initiatives in education played a vital role in improving digital competencies and ICT skills. Uzbekistan is committed to fostering technological innovation and R&D activities in ICT and AI. These achievements are reflected in the positions of Uzbekistan in the international indices and global rankings (Table 5).

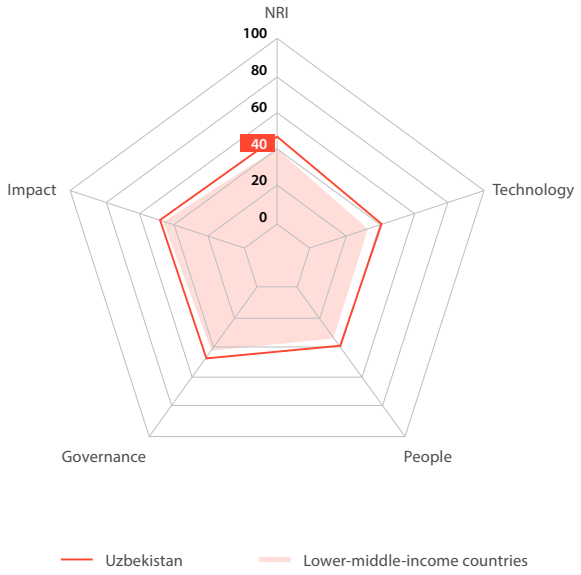
Table 5. Uzbekistan ranking in international indices

Index	2018	2019	2020	2021	2022	2023	2024
E-Government Development Index*	81 (193)	...	87 (193)	...	69 (193)	...	63 (193)
E-Participation Index*	59 (193)	...	46 (193)	...	55 (193)	...	53 (193)
Government AI Readiness Index	...	158 (194)	95 (172)	93 (160)	79 (181)	87 (193)	70 (188)
Network Readiness Index	...	...	...	...	...	82 (134)	81 (133)
Global Innovation Index	...	...	93 (131)	86 (132)	82 (132)	82 (132)	83 (133)
Global Knowledge Index	...	...	...	100 (154)	86 (132)	78 (133)	78 (141)
ICT Development Index	...	...	...	...	...	56 (168)	60 (169)
Global Attractiveness Index	...	...	...	76 (148)	81 (148)	64 (146)	63 (146)
Global Sustainable Competitiveness Index	85 (180)	68 (180)	61 (180)	84 (180)	91 (180)	89 (180)	119 (191)

Sources: *UN E-Government Knowledgebase; Oxford Insights; Portulans Institute; WIPO; UNDP & MBRF; ITU; The European House — Ambrosetti Group; SolAbility Sustainable Intelligence.

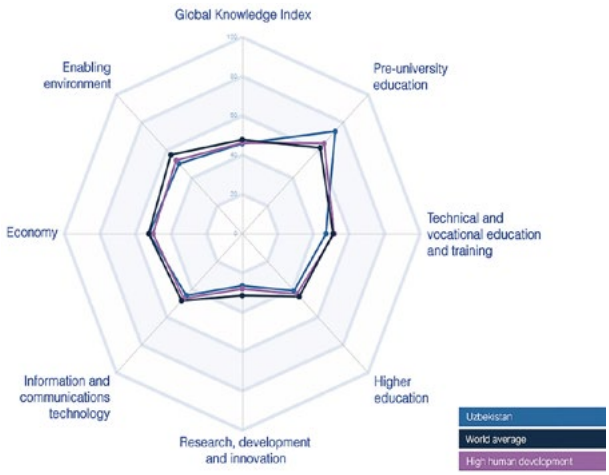
Over the past few years, Uzbekistan's position in the E-Government Development Index and in the E-Participation Index remained stable: 63rd and 53rd (out of 193), respectively. Among the subcomponents of the E-Government Development Index, the most significant increase was observed in the Telecommunication Infrastructure Index, which rose from 0.6575 in 2022 to 0.8769 in 2024 (UN DESA, 2024). Key contributing factors for the increase in the telecommunication infrastructure include improvement in the internet penetration, an increase in mobile-broadband and mobile-cellular subscriptions and lower costs of mobile data and broadband services. The Government AI Readiness Index 2024 ranks the country 70th (out of 188), the third highest place in South and Central Asia.

Uzbekistan has improved the rank in the Global Attractiveness Index since 2022 by 18 positions: 63rd place (out of 146) in 2024. The country ranks 60th (out of 169) in the ICT Development Index (2024) demonstrating substantial progress in digital readiness.



The Network Readiness Index placed Uzbekistan at the 81st position (out of 133). Achievements are seen in the following areas: adult literacy rate (1st), fibre to the home/building internet subscriptions (9th), international internet bandwidth (18th), mobile broadband internet traffic within the country (40th), internet access in schools (43rd), AI scientific publications (43rd), mobile tariffs (55th), e-participation (55th), government online services (57th) and government promotion of investment in emerging technologies (63rd).

Figure 3. Comparison of Uzbekistan with lower-middle income countries in the Network Readiness Index 2024. Source: Portulans Institute, p. 211.



Uzbekistan occupies 78th position (out of 141) in the Global Knowledge Index 2024, 17th rank among 35 high HDI countries. The country's highest rankings are in pre-university education (41st) and economy (66th). The areas of strength are completion rate in upper secondary education, wealth parity, tertiary graduates from STEM programmes, unemployment rate with advanced education, gross fixed capital formation as % of GDP and ease of starting a business (see Fig. 4).

Figure 4. Comparison of Uzbekistan with world average score and average score of countries with high HDI in Global Knowledge Index. Source: UNDP & MBRF, Global Knowledge Index 2024, p. 456.

In the Legatum Prosperity Index 2023, Uzbekistan ranks 100th overall and 73rd in the Education pillar (out of 167). The areas of strength are Adult Skills (60th), including sub-indicators: Adult Literacy (18th) and Women's Average Years in School (56th).

In the Global Innovation Index 2024, Uzbekistan holds 83rd position among 133 economies (10th place among the lower middle-income group countries and the fourth position in Southern and Central Asia region), demonstrating impressive potential in labour productivity growth (7th) and in the number of graduates in science and engineering (12th).

In the Huawei Global Digitalization Index 2024, Uzbekistan occupies 60th position out of 77 countries evaluated for their digital maturity on such criteria as Digital Foundation, Ubiquitous Connectivity, Green Energy, Policy and Ecosystem.

In 2023, Uzbekistan made its debut in the Global Talent Competitiveness Index (GTCI) and was ranked 62nd out of 134 countries, leading the group of lower-middle-income countries in the Central and Southern Asia region. Uzbekistan excels in the Vocational and Technical Skills pillar (31st globally) and sub-pillars Mid-level Skills and Employability (39th and 27th, respectively), within the latter the sub-indicator Relevance of Education System to the Economy, Uzbekistan ranks 34th. Uzbekistan's most pronounced challenge lies in the Growing Talent pillar, ranking 100th globally (INSEAD, 2023).

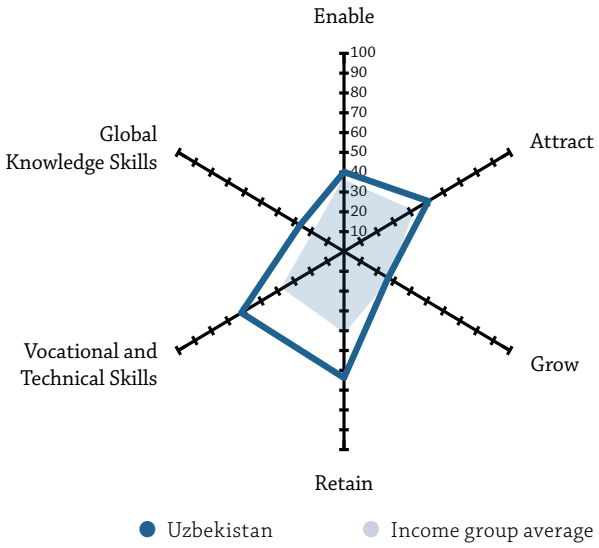


Figure 5. Comparison of Uzbekistan with lower-middle income countries average score in the Global Talent Competitiveness Index 2023. Source: INSEAD, p. 197.

Despite the considerable advancements described above, certain challenges have been revealed. The Government of Uzbekistan has developed a solid framework of legislative acts and strategic frameworks to accelerate the country's digital transformation; however, the holistic strategy for ICT skills development is lacking. There is a room for improvement in bridging a gap between the skills of new labour market entrants and employers' expectations. Underinvestment in R&D, especially in ICT and AI, remains a key constraint on innovation, reduces competitiveness and results in the country's underrepresentation in the global knowledge networks. A series of strategic initiatives aimed at bridging the gender gap was implemented; nevertheless, the disparities between male and female participation in STEM and ICT education and the job market persist.

The set of recommendations is proposed to foster the growth of digital skills and talent development, enhance digital ecosystem and competitiveness of the Republic of Uzbekistan.

Recommendation 1: Develop a comprehensive digital education strategy to bridge the skills gap, foster innovation and create a globally competitive IT workforce. The strategy should be focused on training IT professionals capable of thriving in a global competitive labour market. It is supposed to include annual training targets; key skill areas aligned with the market needs and a roadmap for its implementation. The strategy should specify the roles for all stakeholders, identify responsible institutions and provide justification based on the economic and workforce development goals. It should prioritize inclusivity, ensuring women, individuals with disabilities and residents in remote areas can access these training programmes. Analysis of successful international models will provide valuable insights to guide this initiative.

Recommendation 2: Modernize IT infrastructure of educational institutions to accelerate digital transformation in the higher education sector. Upgrading university

laboratories with adequate computing equipment, cloud platforms and cybersecurity training environments is essential. Smart classrooms featuring VR, AR and AI-based learning tools should be implemented to improve digital education methodologies. Establishing AI and Robotics research centres will foster innovation and entrepreneurship among IT graduates.

Recommendation 3: Align curricula with global standards and industry needs to enrich higher education and vocational training, enhance workforce readiness for labour market and expand work-study opportunities. HEIs should actively integrate AI, big data and cybersecurity into their curricula. Collaboration with universities worldwide should be encouraged to provide dual-degree programmes in AI, data science, cybersecurity and software engineering. AI and big data courses should be developed to equip students with data analytics, machine learning and AI skills. Cybersecurity courses should be introduced, focusing on information security, digital risk management and ethical hacking to meet the growing demand for cybersecurity professionals. Courses on blockchain, digital banking and financial data security will prepare students for careers in the fintech sector. Programming and software development training should incorporate industry-relevant programming languages. Specialized courses on the IoT and autonomous systems, cloud computing and DevOps will prepare graduates for the evolving labour market. Incorporation of open-source practices into the curricula is crucial to cultivate technical skills and encourage participation in open-source projects and coding communities on GitHub.

Recommendation 4: Foster academia–industry collaboration in research and education to enhance global competitiveness of the country`s digital economy. University–business partnerships should be spread out from the joint revision of curriculum and joint training programmes with IT companies through internship and apprenticeship programmes to collaborative research and innovation. An IT Advisory Council, comprising leading tech companies and industry experts, should be formed to ensure that educational programmes are aligned with the evolving economy needs. Collaboration between universities, Government and private sector will be essential in shaping a resilient labour market, capable of meeting the challenges of digital transformation.

Recommendation 5: Promote industry-recognized certifications, upskilling and reskilling programmes and lifelong learning to strengthen ICT and digital skills of the workforce. To maintain employment stability and address displacement from disappearing jobs, upskilling and reskilling programmes should be launched for transfer into digital and IT-related professions. Coding boot camps and vocational training programmes should be offered to non-tech professionals seeking careers in IT. It is essential to provide lifelong learning opportunities through accessible nationwide programmes and e-learning platforms. Educational institutions should be encouraged to incorporate globally recognized IT certifications into their degree programmes.

Recommendation 6: Develop soft skills and multilingual competencies to compete in a globalized digital economy. Educational institutions should integrate problem-solving, strategic thinking and decision-making modules into IT and engineering curricula to strengthen students' critical thinking and adaptability. Project-based learning approaches should be employed to enhance collaboration, teamwork and communication skills. Leadership development programmes should be introduced to prepare students for the managerial and executive roles in IT companies. Multilingual proficiency must be

enhanced. Proficiency in foreign languages should become a core requirement for IT students to strengthen their competitiveness at the global labour market. Specialized language courses should be developed to help IT-students effectively discuss complex technological concepts in international work environments.

Recommendation 7: Close gender gap in mobile and internet access and expand women's participation in ICT and STEM education and job market to foster more inclusive digital development. Targeted initiatives, such as expanding digital literacy programmes and promoting awareness campaigns tailored to women, should be prioritised. It is advisable to expand existing initiatives such as "ICT4Girls", "Women in Tech", "IT Ladies Uzbekistan", "Tumaris.Tech", "Digital Girls" and women's club "Gap", and introduce new initiatives to ensure equitable access to mobile services and internet, encourage women fully benefit from the opportunities provided by the digital economy.

Annex. ICT Talent Cultivation Paving the Way to All Intelligence[49]

Huawei has been dedicated to working with partners across the Middle East and Central Asia to deliver greater value to individuals, organizations and entire nations. Over the years, Huawei has played an active role in shaping national digital transformation strategies, both globally and regionally. A key factor in every successful transformation has been the cultivation of digital talent, which is essential for a national progress.

By the end of 2024, Huawei had established over 260 ICT Academies in partnership with leading universities across 19 countries in the region: more than 300,000 students and 2,000 teachers have been trained in advanced ICT skills and over 35,000 individuals have earned technical and project management certifications. At the ICT Academies, students gain access to the latest technologies, develop essential ICT skills and obtain internationally recognized professional certifications. Students are also encouraged to participate in the annual ICT Competition, which allows them to compete, collaborate and connect with peers from across the globe, gaining exposure to leading innovations and new perspectives. Top-performing students often secure jobs and internships at Huawei or its partner organizations. Huawei has built a comprehensive programme to support participants throughout their development and help to bridge the gap between education and employment. The rapid growth and effectiveness of the ICT Academy and ICT Competition are due to strong support from national governments and talent initiatives, partner organizations and, as importantly, Huawei's ongoing investment in empowering ICT talent for an intelligent future.

Huawei's guiding principle "Digital Talent Cultivation Paves the Way to All Intelligence" consists of four subprinciples:

1. Developing an environment that nurtures digital talent.
2. Providing advanced digital skills needed for industry transformation.
3. Unlocking potential and creating opportunities through job fairs and internships.
4. Leading the digital transformation of higher education with innovative platforms throughout the learning process.

In alignment with the Education 2030 Agenda and SDG 4, UNESCO IITE promotes the innovative use of ICT, empowers teachers and facilitates knowledge sharing to transform education worldwide. The collaboration between UNESCO IITE and Huawei on ICT talent cultivation by leveraging technology, educational innovation and global best practices is aimed to equip students and professionals in the Middle East and Central Asia with the digital skills and competencies necessary for sustainable development and inclusive digital transformation. In the framework of this partnership, Huawei activities are focused on empowering local communities with digital skills, promoting knowledge exchange and sustainable technology adoption.

[49] The Annex is the courtesy of Huawei.

Nurturing ICT talent is a long-term commitment, much like planting trees for future generations. As the old proverb says: "The best time to plant a tree was 20 years ago, the second-best time is now". While the world undergoes rapid transformation driven by intelligent technologies, ICT talent remains at the core, enabling innovation across all sectors. Huawei's comprehensive and strategic approach to nourishing ICT talent in any one country is inspired by the national vision and global best practices. It is embodied in tangible on-the-ground initiatives outlined in a clear roadmap for the translation of high-level goals into actionable programmes. The entire framework is guided by the national vision/strategy. A three-pronged approach is focused on digital transformation, ICT leadership and economic prosperity. ICT talent is at the heart of this approach, pumping intelligence to every sphere of life and every industry. The phrase "Talent for Intelligence" can be read reversely as "Intelligence for Talent", which reflects the need for advanced technology innovations throughout the full life cycle of the cultivation and development of ICT talent at the level of students, teachers, campus, contents and administration. Figure 1 details four key pillars, acting as a distinct, yet interconnected, initiative.

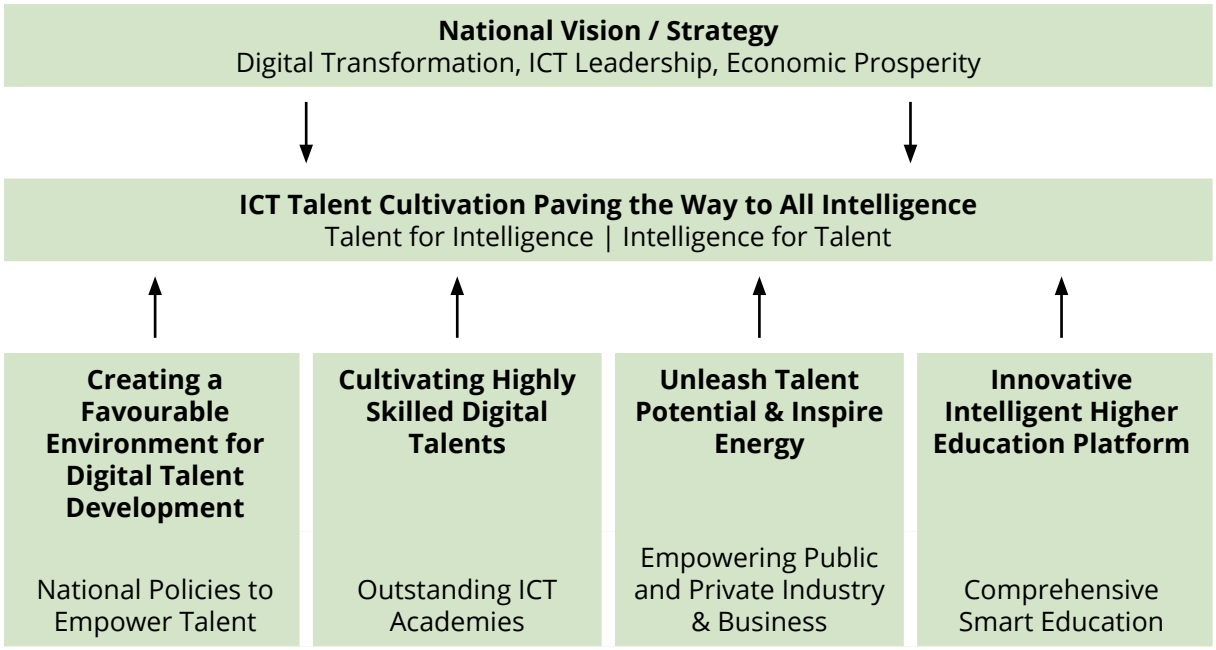


Figure 1. ICT Talent Ecosystem Framework

Pillar 1: Creating a Favourable Environment for Digital Talent Development

The first pillar is about establishing the right conditions for growth through national policies, talent development programmes, skills certification and competitions to improve hands on practice and foster innovation in ICT. Industry best practices for ICT talent development emphasize the importance of building a talent ecosystem grounded in partnerships. Governments seeking to enhance ICT talents and skills among citizens can use ICT Academies to deliver educational content based on digital platforms, while maintaining close collaboration with universities and colleges, upholding the following key essentials.

- **Integration with higher education:** By embedding ICT training into university and college programmes, students from diverse backgrounds gain access to world-class tech education, levelling the playing field and creating pathways to economic advancement. Several ICT Academies have been established in Uzbekistan in collaboration with the leading HEIs (Tashkent-based Inha University, Amity University, New Uzbekistan University, TUIT and Kimyo International University) to cultivate a new generation of skilled professionals and provide internationally recognized certification in advanced fields such as AI, digital technologies, 5G, big data and cloud computing.
- **Government involvement:** Policy support and funding from government agencies are crucial for scaling ICT talent initiatives and ensuring alignment with national digital strategies.
- **Digital training platforms:** Centralized platforms enable the delivery of educational content, facilitate assessment and support remote and blended learning models, ensuring continuity and flexibility in talent development.
- **ICT Competition:** The ICT Competition, celebrating the 10th anniversary in 2025, has grown into a widely recognized international platform for ICT talent contest, industry-academia collaboration and international cooperation. The competition now spans over 100 countries in several regions, engaging more than 2,000 universities and over 960,000 students and teachers. It fosters cross-regional cooperation and talent exchange among higher education institutions worldwide. It promotes the integration of theory and practice in higher education through the "competition-driven learning and teaching" model. Over the eight years, the regional edition for the Middle East and Central Asia has attracted over 160,000 participants. Since 2024, UNESCO IITE has been the co-organizer of the event. In Oman, Saudi Arabia and Bahrain, the competition has received endorsement from ministries of education and support from local enterprises and telecom operators, ensuring multi-stakeholder participation in talent development. The competition supports regional digital transformation and alignment of talent development with global standards.

In October 2024, over 520 students from across Uzbekistan registered for the Huawei ICT Competition 2024-2025, demonstrating growing national interest. After national rounds, six students from TUIT (Tashkent University of Information Technologies named after Muhammad al-Khwarizmi) and Inha University in Tashkent represented Uzbekistan at the regional finals in Riyadh, Saudi Arabia in December 2024.

Every year Uzbekistan students participate in the ICT Competition. Within the ICT Competition 2024–2025, six Uzbekistan students from TUIT and Inha University in Tashkent reached the finals held in Riyadh, Saudi Arabia. The project of three TUIT students "Sahiya" — AI-powered app for individuals with hearing and speech impairments, digitizing sign language and providing real-time voice translations — won the first prize.

Such awards as the "Women in Tech", "Green Development" and "Digital Inclusion" make an emphasis on diversity and sustainability, which reinforces and broadens their social impact.

- In early 2025, Huawei has elevated its collaborative programme in the Middle East and Central Asia to the next level by championing a comprehensive AI talent cultivation programme **T.H.E. GOLD Talent** (**T**housands miles exploration, **H**undreds universities collaboration, **E**mpowering intelligent future. Together, we will **G**ear it up for you to **O**wn your future by our **L**eading platform for intelligent **D**evelopment of intelligent talent). The programme marked the second decade of Huawei's commitment to ICT talent development and opened a transformative decade inspired by new leading-edge technologies. The programme focuses on:
  - Cultivating AI-based well-rounded talent with industrial problem solving ability.
  - Transforming higher education by using AI-based innovations throughout the lifecycle of ICT talent cultivation targeting students, teachers, campus, contents and administration.
  - Closing the loop of ICT talent cultivation process through job-fairs and internships with engagement of all industrial stakeholders.
  - Providing incentives for active universities: certification vouchers, trainings and workshops for students, instructors and administrators.

During the first five years, the programme intends to train and develop One Million AI Talents in the region. As of August 2025, in collaboration with over 100 universities, 220,000 individuals were equipped with the AI skill sets essential for advancing digital transformation.

- **Seeds for the Future** programme is the global corporate social responsibility initiative launched in 2008 to develop skilled ICT talent and foster cross-cultural communication. The programme brings together top students from around the world aiming to bridge the divide between academic learning and real-world industry needs, offering hands-on experience in technologies, guided by top experts. Supported by local ministries, regulatory authorities and educational institutions, the programme advances and promotes four key pillars: innovation, digitalization, sustainability and entrepreneurship, ensuring that young talents are well equipped to address global challenges and able to drive local industry transformation. Through Tech4Good, students are challenged to solve real-world social problems by leveraging cutting edge digital technologies, nourishing the next generation of socially conscious tech entrepreneurs. This continued investment is vital for the cultivation of young ICT leaders who contribute meaningfully to the growth of local and global digital economies.

> In 2024, Tashkent hosted the regional Seeds for the Future camp for the Middle East and Central Asia, welcoming over 150 students from 14 countries, including 15 participants from Uzbekistan. Since its introduction, 162 Uzbek students have benefited from the programme. In 2023, a student team from Uzbekistan won the Silver Award and the People's Choice Award at the global Tech4Good finals.

Within the programme, Huawei Uzbekistan in collaboration with the Ministry of Digital Technologies and the IT Education Association organized a regional event in Tashkent.

Alongside the award ceremony for the Tech4Good competition winners, 150 participants from 14 countries across the Middle East and Central Asia were engaged in one-week intensive training in advanced ICT, including 5G, AI, cloud technologies and Wi-Fi 7.

Pillar 2: Cultivating Highly Skilled Digital Talents

The second pillar is about building strong partnerships between universities and enterprises and providing incentives for training the next generation of qualified instructors to meet the demand for talented professionals, who will drive scientific and technological progress and preserve cultural heritage. Universities, using a strong foundation in theoretical knowledge and abundant teaching resources, cultivate talents and contribute significantly to the development and prosperity of the nation, while enterprises have successful practical experience and diverse application scenarios. Therefore, their collaboration is crucial for establishing a high-quality talent cultivation system.

In April 2025, over 100 Chief Digital Officers and ICT faculty heads from universities across Uzbekistan underwent Smart Campus and AI Integration training, jointly supported by Huawei and the Ministry of Higher Education, Science and Innovation.

15 universities in Uzbekistan have been officially qualified as Huawei ICT Academies, delivering certified training in advanced fields such as 5G, AI, Cloud Services, Cybersecurity and Networking. Every university has the potential to train up to 200 students annually, with certification vouchers (HCIA-level) as part of the programme.

Huawei works with government agencies and educational organizations for ICT talent development. In the era of AI technology, Huawei ICT Academies are intended to address the growing need for ICT talent development by creating localized learning materials, offering learning platforms and collaborating with governments to train skilled ICT professionals. The ICT Academy is a collaborative programme that aims to provide universities with the latest ICT and knowledge. The ICT Academy Support Centre (IASC) is certified and authorized to provide local support for the operation of ICT Academies: (1) assisting in expanding the ICT Academy network; (2) providing teacher training services for supported ICT Academies; (3) assisting supported ICT Academies with course offerings and addressing issues related to curriculum, lab environments, teaching platforms and exam applications; (4) assisting in organizing teaching seminars, ICT Academy conferences and talent recruitment events. Huawei has established 38 IASC across the globe operating in 24 countries to support over 500 ICT Academies providing training to 300,000 students annually. Five Centres operate in four countries across the Middle East and Central Asia, providing support to more than 120 ICT Academies that train over 100,000 students annually.

Huawei's ICT courses mainly include general courses, professional and certification courses that are closely related to the industry needs and are required for cultivating industry-oriented talent in the future. From the technical perspective, the courses can also be divided into three categories: cloud and computing, connectivity and application development. The courses designed for colleges and universities follow students' improvement path of ICT theories, hands-on practice and application innovation. Modular courses are offered based on the credit-based teaching model of colleges and universities. Each course provides rich learning and teaching resources, including syllabus, MOOC,

slides, electronic teaching materials and lab guide (for students), as well as lab guide (for instructors), lab setup guide and mid-term/end-of-term test questions. The ICT Academy has released a total of 134 courses in languages other than Chinese, including 51 in English and 83 in other languages: French (13), Arabic (14), Portuguese (15), Spanish (18), German (8), Russian (4), Indonesian (5), Japanese (2), Turkish (1) and Kazakh (3).

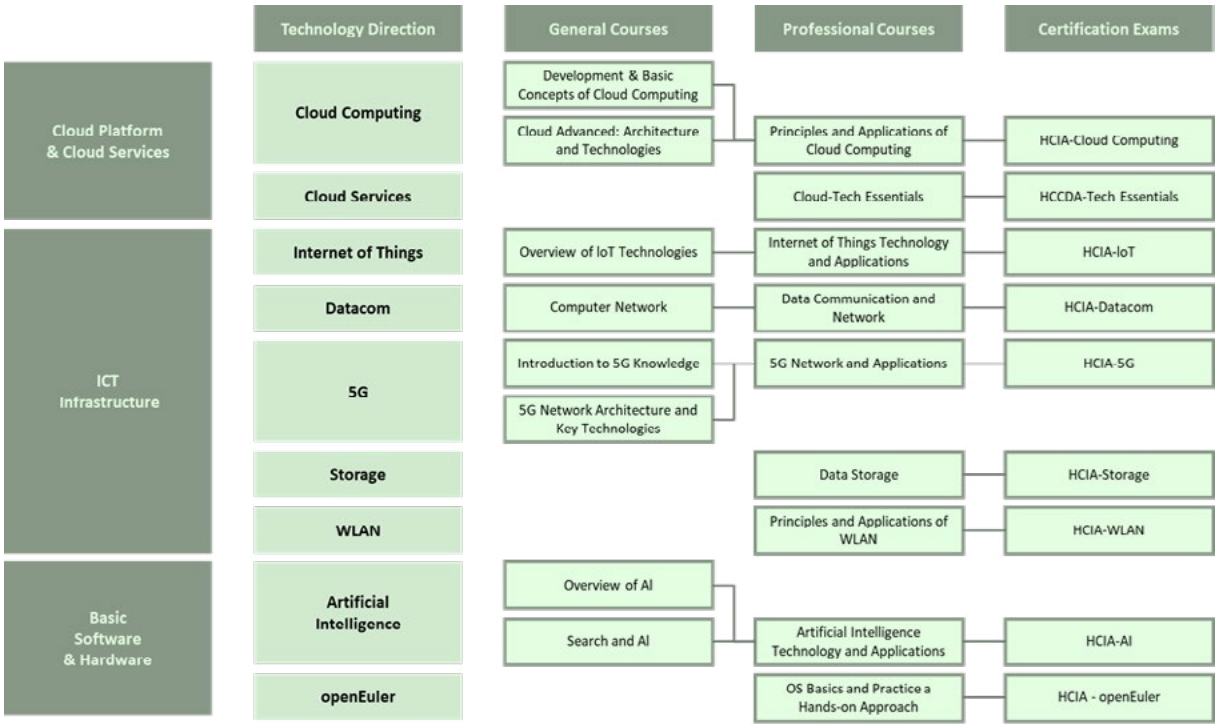


Figure 2. Huawei ICT Academy Course and Certification

Pillar 3: Unleash Talent Potential and Inspire Energy

The third pillar is a bridge to the professional world, offerIng access to job opportunities for students through internships and campus job fairs and creates a pool of certified talents for potential employers. All faculty enablement and innovative training programmes are aimed to enhance the ICT skills of both teachers and students and lead to decent careers. Through university-enterprise collaboration projects, Huawei helps teachers to combine theory and practice in the field of ICT, building on an online talent platform with comprehensive functions to facilitate learning and communication.

Pillar 4: Innovative Intelligent Higher Education Platform

The fourth pillar is about modernizing the educational experience itself, which includes developing smart classrooms, smart campuses and a nationwide research and education network. This provides the cutting-edge tools and environment needed to train the next generation of digital leaders.

Higher education ICT infrastructure and enablers

The education sector stands at the forefront of profound change, propelled by technological advancement and the urgent need to address challenges such as inequality,

accessibility and opportunity gaps. Digital transformation in education is not simply about introducing new technologies; it is about reimagining how learning is delivered, managed and experienced. From classrooms equipped with intelligent technology and AI to cloud-based systems that foster seamless learning experiences, innovative digital solutions are helping make education more equitable, high-quality and accessible to all. In today's fast changing world, everyone needs access to quality education to close economic and social gaps and to prepare future leaders and innovators. Digital technology is driving major changes in education, creating new ways to make learning fair, accessible and effective for all. Smart classrooms, AI tools and cloud systems transform teaching and learning. Huawei is working with the industry stakeholders to lead this transformation through its Digital Education blueprint "1+3" approach which includes ICT Talent Development, Smart Classrooms, Smart Campuses and Scientific Research.

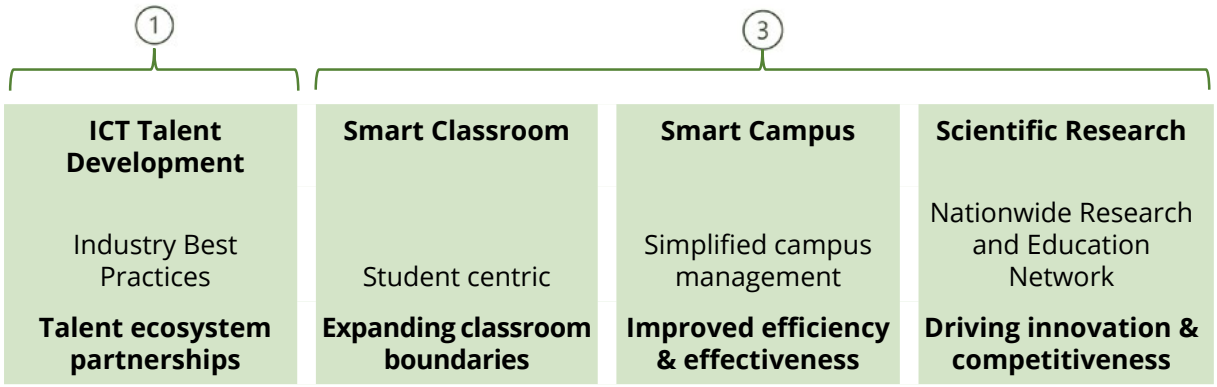


Figure 3. Digital Education blueprint

ICT talent development (digital training)

As digital transformation of various industries enters the next stage, there is a shortage of interdisciplinary talent with both ICT skills and industry knowledge. To address this issue, Huawei launched the Digital Training Solution to help universities and vocational colleges cultivate applied ICT talent. The solution provides comprehensive services ranging from industry case studies, teaching plan, curriculum, practice, teacher training, certificate and employment guidance, based on close collaboration with partners in the industry talent demand chain to promote ICT talent development and supply. Huawei Digital Training Solution combines the one-stop talent training platform, Digital Training Practice Lab, rich teaching resources and hands-on training tools to provide multiple ICT courses for universities and vocational colleges, to cultivate ICT talent with theoretical knowledge and applied skills and to help schools build a cross-domain, cross-disciplinary and cross-region training base featuring industry-academia collaboration.

Smart Classroom: expanding the boundaries of learning

The Smart Classroom represents the first and most fundamental layer of ICT talent and skills development. It is inherently student-centric, designed to expand classroom boundaries before, during and after class. The Smart Classroom leverages advanced ICT infrastructure to create interactive, personalized and engaging learning environments.

ICT infrastructure requirements for Smart Classroom:

- High-speed connectivity: reliable wired and wireless networks are essential to support real-time collaboration, access to digital resources and seamless integration of devices.
- Interactive display technologies: large-format interactive panels, projectors or digital whiteboards enable dynamic presentations, collaborative problem-solving and multimedia content delivery.
- Student and teacher devices: laptops, tablets and other devices facilitate both in-person and remote participation, ensuring all students can engage with digital content.
- Learning Management Systems: centralized platforms for distributing assignments, tracking progress and facilitating communication between students and instructors.
- AI-powered analytics: tools that analyse student engagement and performance data, providing actionable insights for personalized instruction and timely interventions.
- Classroom collaboration tools: software for live polling, group projects and digital board activities, supporting active learning and critical thinking.
- Content creation and sharing platforms: systems that allow educators to develop, curate and share digital learning materials tailored to diverse learning styles.

Before Class: Teachers use digital tools to prepare lessons tailored to each student's needs, leveraging analytics to identify knowledge gaps and recommend resources. This proactive approach ensures students are better prepared and more engaged from the outset.

During Class: Interactive technologies facilitate real-time collaboration, enabling students to participate in group projects, live discussions and digital activities whether in person or remotely. AI-driven feedback helps teachers adapt their methods to maximize participation and understanding.

After Class: Analytics platforms offer insights into student performance and engagement, helping educators identify those who may need additional support or enrichment. Students receive personalized feedback and recommended resources, fostering continuous learning and improvement.

By integrating these components, the Smart Classroom creates a comprehensive learning experience that supports students and teachers before, during and after class, making education more inclusive, engaging and effective.

Success Story — Innovating Education Models with 300 Futuristic Classrooms

Ningxia University has contributed to the redefinition of higher education through a strategic digital transformation. In response to the evolving demands of today's economy and society, the university is establishing itself as a regional innovation hub for talent and technology in western China. Central to this forward-thinking initiative is the development of 300 state-of-the-art smart classrooms that seamlessly integrate digital, interactive and intelligent teaching methods to create a cohesive learning ecosystem.

This transformation is especially attuned to the needs of Gen Z learners-students who have grown up with instant connectivity, mobile devices and digital media. The School of Life Sciences uses a social media like environment of real-time resource sharing and interactive dialogue, turning traditional lectures into dynamic, two-way exchanges. In a similar spirit, the School of Ethnology enriches history lessons by incorporating digital media such as videos, images and virtual archives, inviting students to engage in immersive debates and reflective discussions, while the School of Agriculture adopts a cloud-based learning platform that supports pre-class preparation, in-class interaction through a smart system and post-class consolidation, all enhanced by AI and big data analytics to pinpoint essential learning elements.

By merging physical and virtual spaces, Ningxia University is pioneering innovative teaching models that include flipped classrooms (a teaching approach where students engage with instructional content like videos or readings outside of class, then use class time for interactive activities, discussions and apply what they have learned), hybrid learning and project-based approaches. Advanced technologies like the smart blackboard, integrated with an Education Cloud ecosystem, facilitate efficient content sharing, collaborative group work and instant, data-driven instructional feedback. This comprehensive system enables educators to continuously evaluate and refine their teaching strategies while ensuring that students receive personalized and engaging learning experiences.

Embracing AI, IoT and cloud computing, Ningxia University not only enhances teaching quality and efficiency but also sets a benchmark for modern educational reform. Through its commitment to smart education, the institution equips both faculty and students with the tools and insights needed to thrive in a digitally driven world, paving the way for a transformative future in higher education.

Smart Campus: simplified campus management for enhanced efficiency

Building on the foundation of the Smart Classroom, the Smart Campus encompasses the broader educational environment, focusing on the theme of simplified campus management to improve efficiency and effectiveness. The Smart Campus leverages advanced ICT infrastructure to connect people, devices and systems across the institution.

Key ICT infrastructure components for Smart Campus:

- Cloud data centres: centralized computing resources that support data storage, processing and application hosting for campus-wide services.
- Fiber and wireless networks: high-speed backbone networks and pervasive wireless coverage ensure connectivity across all campus facilities, enabling seamless access to digital resources.
- Edge and IoT devices: sensors, cameras and smart devices collect real-time data on campus operations, security and resource usage.
- Digital enablement platforms: platforms that integrate big data analytics, unified communications and IoT management, providing a foundation for intelligent campus services.

- Integrated communications: unified communication systems facilitate collaboration among students, faculty and staff, supporting voice, video and messaging.
- Intelligent operations centre: a centralized hub for monitoring and managing campus operations, security and emergency response.
- Smart education platforms: systems that manage academic records, scheduling, facilities and student services, streamlining administrative processes.
- Campus security: IoT sensors and AI-driven analytics enhance safety through real-time monitoring, automated alerts and incident response.
- Energy management: smart meters and automation systems optimize energy usage, reducing costs and environmental impact.
- Facility management: digital platforms track maintenance needs, occupancy and resource allocation, improving operational efficiency.
- Student services: mobile apps and self-service kiosks provide students with real-time information on schedules, transportation and campus events.

By integrating these technologies, the Smart Campus transforms campus life, creating a connected, sustainable and safe environment that supports both academic and administrative excellence.

Success Story — Pioneering Digital Transformation in Higher Education

Dongguan University of Technology, the first general undergraduate institution in Dongguan, Guangdong Province, completed the redesign of operations by embracing a forward-thinking digital transformation that spans Songshan Lake and Guancheng campuses. The institution redefined the learning environment through the seamless integration of state-of-the-art teaching tools and remote technologies that foster an atmosphere where teaching and learning extend beyond traditional boundaries.

The university launched an innovative initiative that enriches the classroom experience by incorporating advanced whiteboards, projectors and remote teaching systems. This digital framework not only elevates teaching efficiency but also ensures that students can access interactive and engaging content at any time. By adopting a modern Teaching Cloud platform, the institution is able to facilitate hybrid teaching models that bring learning to life, making every class a dynamic encounter rather than a static lecture.

At the core of this transformation is an interconnected digital ecosystem built on cutting-edge display and interaction devices, comprehensive recording and live streaming systems and reliable IoT management units. These technologies work harmoniously over a high-speed campus network to support dual-screen teaching, multi-terminal interactions and group collaborations. This integration creates a fluid and cohesive teaching environment where both instructors and students can benefit from an engaging online and offline hybrid approach.

Real-time interaction and data-driven feedback lie at the heart of this initiative. Comprehensive data recordings throughout classes allow for precise evaluation of

student performance, while the introduction of innovative learning methods-such as group-based learning and remote synchronous classrooms-has led to a 62% increase in student interaction rates. With a 95% boost in network speeds, access to extensive digital resources is both swift and seamless, and a 60% surge in the use of online on-demand courses reflects how deeply integrated and accessible these learning materials have become. The enhanced digital infrastructure also facilitates real-time online supervision, reducing administrative workloads dramatically.

Scientific Research: enabling nationwide research and education networks

The third layer of the "1 plus 3" framework focuses on Scientific Research, which is vital for driving innovation and maintaining global competitiveness. This layer requires a robust, scalable and secure ICT infrastructure that connects students, educators and research resources across institutions and borders.

Core ICT infrastructure for Scientific Research:

- Nationwide Research and Education Network (NREN): high-speed, secure and scalable networks that interconnect universities, research institutions and laboratories, enabling collaboration and resource sharing.
- Education cloud: centralized platforms that manage large-scale data, facilitate access to national and global content and support advanced research applications.
- Trust and identity management: systems that ensure secure access to research resources, protecting sensitive data and intellectual property.
- Advanced security solutions: comprehensive cybersecurity measures to safeguard research data and maintain the integrity of collaborative networks.
- Shared access to research infrastructure: platforms that allow institutions to share high-performance computing, storage and specialized research tools, optimizing resource utilization and fostering innovation.

Benefits of Scientific Research infrastructure**:**

- Collaboration: researchers can collaborate in real time, share data and findings and access global expertise, accelerating the pace of discovery.
- Resource optimization: centralized management of computing and storage resources enables institutions to support large-scale, data-intensive research projects without duplicating investments.
- Uninterrupted access: education cloud platforms ensure that researchers and students have continuous access to critical resources, regardless of location or time.
- Security and compliance: robust identity management and security protocols protect sensitive research data and ensure compliance with regulatory requirements.

By investing in these advanced ICT infrastructures, higher education institutions can support cutting-edge research, foster innovation and contribute to national and global knowledge economies.

Success Story — The Best Education Cloud in the UAE and Middle East

In today's increasingly digital landscape, the education sector must evolve to meet the always-on demands of both students and educators. Ankabut, the Advanced National Research and Education Network of the United Arab Emirates, embodies this transformation with a clear vision. As the country's largest ICT service provider in education, Ankabut delivers a wide range of services, from cloud solutions and network connectivity to comprehensive IT infrastructure, and managed services, to over 35 educational institutions and 80 campuses, including the UAE Ministry of Education and Khalifa University.

Recognizing the central role of cloud technology in fostering collaboration in today's interconnected world, Ankabut strategically established a premier education cloud that serves universities and research institutes throughout the UAE and the broader Middle East, through the rapid deployment of a complete cloud stack that includes a robust cloud platform, cutting-edge software-defined networking, high-speed data centre networks and high-performance all-flash storage.

The design of the cloud stack has allowed for the creation of high-performance resource pools that outperform traditional hardware systems, supported by seamless, ultra-broadband connectivity across multiple data centres, ensuring that a diverse range of workloads-whether physical, virtual or container-based-can operate efficiently. The utilized all flash storage, powered by proprietary AI chips and innovative algorithms, set a new industry benchmark by offering remarkable throughput and minimal latency.

The results of this transformative project are evident. By transitioning from traditional data centres to an integrated cloud environment, Ankabut has reduced costs and complexity while providing a unified infrastructure that supports a variety of critical applications, from domain services to intelligent campus management and interactive e-learning platforms. As Fahem Al Nuaimi, CEO of Ankabut, noted, this significant investment not only streamlines academic processes and reduces expenses but also bolsters collaborative efforts, firmly establishing the UAE as a regional leader in education, research and technology innovation.

The Impact of the ICT Talent Development Digital Framework on Education Equity and Quality

The framework for ICT talent development and infrastructure is designed to transform higher education. By prioritizing talent ecosystem partnerships and investing in Smart Classroom, Smart Campus and Scientific Research infrastructures, educational institutions can:

- Bridge the gender and digital divide: ensuring that all students, regardless of background or location, have access to high-quality digital learning resources and opportunities.
- Enhance teaching and learning to bridge the skills gap: empowering educators with tools and data to personalize instruction, engage students and drive better learning outcomes.

- Streamline campus operations: improving efficiency, safety and sustainability through intelligent management of campus resources and services.
- Accelerate collaboration between academia and industry to enhance research and innovation: providing researchers with the connectivity, computing power and collaborative platforms needed to tackle complex challenges and drive scientific progress.
- Foster lifelong learning, upskilling, reskilling and certification: creating flexible, accessible pathways for continuous skills development, supporting workforce readiness and economic growth.

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