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Georgia Education System Digital Readiness Assessment

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Abbreviations

ADB	Asian Development Bank
AfL	Assessment for Learning
AI	Artificial Intelligence
AY	Academic Year
BYOD	Bring Your Own Device
CRM	Customer Resource Management
DAC	Development Assistance Committee
DPGE	Department of Preschool and General Education
GoG	Government of Georgia
EMIS	Education Management Information System
ERP	Enterprise Resource Planning
ESIDA	Educational and Scientific Infrastructure Development Agency
EU	European Union
GDP	Gross Domestic Product
GEL	Georgian Lari
GER	Gross Enrollment Rate
GTMI	GovTech Maturity Index
ICT	Information and Communications Technology
I2Q	Innovation, Inclusion and Quality
ISP	Internet Service Provider
IT	Information Technology
LEPL	Legal Entity of Public Law
LMS	Learning Management System
M&E	Monitoring and Evaluation
Mbps	Megabits Per Second
MCC	Millennium Challenge Corporation
MNO	Mobile Network Operator
NGO	Non-Governmental Organization
NCTPD	National Center for Teacher Professional Development
NROC	National Repository of Curriculum
OECD	Organization for Economic Cooperation and Development
OOSC	Out-of-School Children
P4R	Program for Results
PBL	Project-based Learning
PPP	Public-Private Partnership
PIRLS	Progress in International Reading Literacy Study
PISA	Program for International Student Assessment
SES	Socioeconomic Status
SMS	Short Message Service
STEM	Science, Technology, Engineering and Math
TCO	Total Cost of Ownership
TEEP	Teachers for Education Excellence Project
TEEx	Teachers for Education Excellence
TIMSS	Trends in International Math and Science Study
TPD	Teacher Professional Development
TVET	Technical and Vocational Education and Training
UIS	UNESCO Institute of Statistics
UNESCO	United Nations Educational, Scientific and Cultural Organization

UNICEF	United Nations Children's Fund
URL	Uniform Resource Locator
USAID	United States Agency for International Development
USO	Universal Service Obligation
VBA	Visual Basic for Applications

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Executive Summary

Georgia has grown its economy well and remained committed to advancing the human development agenda over the last decade, but still, several challenges persist. As a lower-middle-income country, the economy of Georgia has grown at an average rate of five percent per year between 2007 and 2019. The agriculture sector remains rooted in rural areas, and poverty remains high in rural areas and among ethnic minorities, limiting the pace of development. Though use of digital devices and access to broadband internet are well situated in few major cities, internet access is unequally distributed, with poor connectivity and limited device use in rural and remote regions. Moreover, the aging and shrinking population due to low fertility and outmigration combined with rapid technological changes are affecting the competitiveness of the labor market and placing new demands on service delivery. These multiple challenges threaten economic growth prospects, widen inequality, and limit the government's resources to address service delivery challenges and long-term development priorities.

Despite multiple challenges, including the pandemic's impact and geopolitical factors, Georgia's economy has shown significant improvement since early 2021. In the face of ongoing geopolitical challenges and the pandemic's distinctive impact on the labor market, along with the resulting fluctuations in unemployment rates throughout the country, Georgia's economy has witnessed a notable upswing since February 2021, marked by heightened economic activity compared to both the previous year and the pre-pandemic period of 2019. The National Statistics Service of Georgia's data indicated a 10.4% real-term growth in the Gross Domestic Product in 2021 compared to the previous year, surpassing the 2019 pre-pandemic levels by 2.9%. At the close of 2021, the unemployment rate also decreased by 1.4 percentage points, settling at 19.0%, while the labor force participation rate and employment rate experienced positive increments of 1.2% and 1.7 percentage points, respectively. By mid-2022, the repercussions of Russia's invasion of Ukraine resulted in significant foreign inflows, driving growth and reducing the current account deficit, even amidst escalating inflation. Growth averaging at least 5.4 percent has been forecasted between 2022 and 2026 by the International Monetary Fund (IMF).

With an ambition to join the European Union (EU), the Government of Georgia (GoG) has provided a strong impetus for transforming the economy with reforms across sectors, including education. In December 2023, Georgia achieved EU candidate status, indicating its dedication to European values and significant reforms in key sectors. At the same time, it must now meet specific EU conditions in areas like democratic governance, the rule of law, human rights, and economic policies to advance in the accession process. GoG has recently adopted a 10-year development strategy, referred to as "Georgia 2030" to balance short and long-term development considerations, aiming at the inclusive growth, large-scale involvement of the citizens in the economic processes, human development, and sustainable development. GoG developed a national strategy for digitalization, E-Georgia strategy, and action plan (2010–2014 and 2023 – 2024), guiding digital development.

Several strategies and programs were implemented to digitalize the education system. The Ministry of Education and Science (MOES) developed the Unified National Strategy for Education and Science for 2022-2030 to improve the quality and relevance of education and make it more inclusive and efficient. The strategy puts an emphasis on strengthening digital education and science ecosystem. In this regard, the priority is to cultivate high-quality, contemporary, and varied digital educational resources across all levels, especially in adapting to the COVID-19 pandemic's challenges. This includes the development of digital platforms that are customized to cater to diverse student interests. Additionally, there is an emphasis on fostering lifelong competencies, with a particular focus on enhancing digital and technology-based skills. Moreover, Georgia's National Broadband Network Development Strategy for 2020-2025 has mandated the internet access and speed to be in line with both EU plans and Georgia's plan in 5G development. The

Government of Georgia (GoG) is committed to adopting reforms to improve human capital outcomes and expand the adoption and use of digital technology to better deliver services and increase transparency, cost-effectiveness, and inclusion, as articulated in the 2022-2030 strategy.

Education plays an essential role in human capital formation and economic growth in Georgia. Substantial international evidence indicates that more and better education contributes to higher rates of return to the individual and society and creates skilled workforces with advanced cognitive skills, socioemotional skills, and digital skills to meet the growing demand of the labor market and digital economy. Between 2010 and 2020, the Human Capital Index (HCI) value for Georgia increased from 0.54 to 0.57. While this is important progress, Georgia's HCI is below the ECA average (0.69) and then EU average (0.71). However, a child born in Georgia today can expect to achieve only 57 percent of their human capital potential than if they enjoyed complete education and full health in 2020. A child starting school at age 4 can expect to complete 12.9 years of school by her/his 18th birthday[1]. Factoring in what children learn, the expected years of schooling in Georgia is only 8.3 years, representing a learning gap of 4.6years. Learning outcomes also lag behind international peers.

Georgia's performance in the 2022 Program for International Student Assessment (PISA) assessment shows a need for improvement in aligning with OECD averages. Georgia ranked 62nd of 81 participating countries in mathematics, 67th both in science and in reading comprehension. Scoring significantly below the OECD average in mathematics, reading comprehension, and natural sciences, with deficits of 82, 102, and 101 points respectively. Overall, the average scores for Georgia in the PISA 2022 assessment for mathematics, reading, and science remained largely consistent with the 2018 results. However, a historical overview of all PISA assessments conducted in the country reveals that the 2022 scores align more closely with those observed in 2012, while falling short of the higher benchmarks set in 2015. This trend indicates a relative stagnation in recent years and highlights the need for an enhanced focus on educational improvement.

The education sector in Georgia poses substantial challenges, despite progress made over the past decades. Compulsory education lasts nine years, covering a 6-year primary education and a 3-year lower secondary education, primarily targeting children between 6 and 14 years old. At age 15, students can either continue their general education to complete grades 10 to 12 or may opt for vocational education and training programs. Georgia has achieved near universal participation in compulsory education, however significant number of young Georgians (ages 15–34) are not in education, formal employment, or training (NEET). Public expenditures in education remain relatively low compared to European countries with similar GDP per capita. High-quality internet bandwidth is unavailable at all schools, with an urban-rural divide. A large number of small-sized schools in remote locations frequently present challenges in relation to digitalization. Though the ICT curriculum is mandated for first, fifth, and sixth grades in primary education, the education system reforms in ICT education face substantial challenges in teacher recruitment, continuous professional development for ICT teachers to keep them abreast of the latest technological developments and teaching methodologies.

In response to the pandemic, the education system in Georgia was locked down starting March 15, 2020 and MES offered remote education via e-learning. Concomitant with school lockdowns, MES launched virtual classrooms on Microsoft Teams, introduced educational TV broadcasts for those without internet access, and allocated additional funding to enhance the technological and infrastructure capabilities of schools. However, unequal access to the internet emerged as a central challenge in Georgia, with 15 percent of school-age children without access at home, while 48 percent of the population reported that

[1] according to 2020 HCI data.

they did not know how to use a digital device. The lack of digital skills for both teachers and students further exacerbated the learning loss through online learning, especially for students in vulnerable groups.

During the pandemic, the shift to online teaching in response to COVID-19 highlighted several ICT-related challenges for teachers and students based on a recent report of the Parliament of Georgia[2]. Despite high engagement in ICT training, a significant proportion of teachers lacked essential ICT competencies, impeding their effective use of digital teaching tools. While technical skills for online teaching were somewhat successfully acquired by teachers, the transition revealed a critical struggle with adapting teaching methodologies for distance learning. This often led to a reliance on traditional lecture modes, which were less effective in the virtual setting. Additionally, adapting student assessment methods to an online format presented a notable challenge, exacerbated by a shortage of resources specifically designed for distance learning. The situation underscored the crucial role of collaboration within schools and the support from various organizations in alleviating some of these challenges. However, the overarching issues of methodological adaptation, resource limitations, and effective student engagement and assessment in a remote learning environment persisted as key hurdles.

GoG has actively proposed digital initiatives to combat the challenges in general education during the pandemic, primarily supported by World Bank, and other development partners including United States Agency for International Development (USAID), the United Nations Children's Fund (UNICEF), and the Asian Development Bank (ADB). The World Bank's engagement in the education sector of Georgia encompasses two major operations aimed at improving the education system. The Innovation, Inclusion and Quality (I2Q) project, backed by a $107 million investment over six years, along other priorities are enhancing data-driven decision-making across the education sector. This is achieved through improvements to the existing Educational Management Information System (EMIS), e-school platforms, and the development of a Learning Management System (LMS). During the pandemic, the project also facilitated the equipping of 433 public schools and around 120 schools with wi-fi connections to support effective remote learning. Additionally, the Human Capital Program (HCP), supports schools in the adoption of Digital Action Plans and implementation of self-reflection tools, and equipping up to 763 public schools with necessary technology such as laptops, printers, projectors, and Wi-Fi connections with a commitment of $15 million dedicated to digital learning. A Program for Results (P4R) program provides funds based on the reporting of results by the loan recipient, with approximately US $400 million financing in Human Capital Investment. Complementing these efforts, other development partners have launched a variety of initiatives covering areas such as civic education, media literacy, gender equity in Technical and Vocational Education and Training (TVET), curriculum development, child-centered education, and addressing the needs of Out-of-School Children (OOSC).

The Digital Readiness Assessment of the education system aims to provide a systematic and holistic view of the current level of readiness in Georgia for achieving its digitalization objectives in the education system, identifying key barriers, opportunities, and potential risks that need to be managed. This assessment's findings and recommendations aim to foster an informed policy dialogue with the Georgian government, focusing on digitally transforming its education system, particularly general education. The insights will guide policy development for enhancing the overall effectiveness, inclusivity, and resilience of the system for future potential crises, while also addressing the recovering of learning losses due to COVID-19.Additionally, they will support aligning with EU educational standards using digital tools, driving education reform to bridge skills gaps, promoting lifelong learning, and preparing for a digital economy, thereby reinforcing Georgia's commitment to the EU's digital and educational agenda and its EU membership aspirations. The assessment framework and detailed methodology and approach can be found in Annex 2.

[2] The Impact of COVID19 on General Education, Thematic Research Paper, Education and Science Committee of Parliament of Georgia, 2021

The Digital Education Readiness Assessment roots the analysis in a digital readiness condition for human development, covering five pillars. It includes: (a) leadership and governance, (b) enabling infrastructure, (c) human capacity, (d) education service delivery and analytics, and (e) EdTech market and business models. A comprehensive, evidence-based, yet flexible approach was taken to better understand the current state of play. This assessment triangulates existing analysis, administrative and open access data with new data collected using a Digital Readiness in Education survey instrument and interviews to get a wholesome picture, comparing, wherever possible, the de jure policies against the de facto practices. Institutions and organizations that are mandated, interested, and/or considered relevant in playing a role in education digitalization activities were identified for this system-level assessment as part of a stakeholder mapping exercise.

The current level of digital readiness in the education system is determined to be at an *Emerging stage* (Table 1. and Figure 1.)

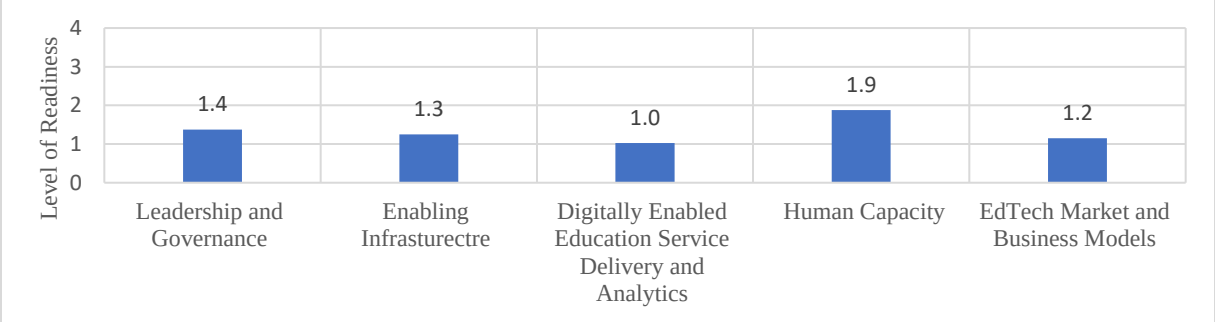
Table 1: Georgia's overall Digital Education Readiness Assessment results

Level 1 - Latent	Level 2 - Emerging	Level 3 - Established	Level 4 - Advanced
Foundational investments that are required for technology solutions to be adopted are lacking and impede further progress.	Foundational investments have progressed, but many issues remain. Functional investments are growing opportunistically.	Foundational investments have taken root and stabilized. Functional investments are used to build evidence to scale systematically. There are marginal opportunities for frontier investments.	Foundational and functional investments are scaled up and continue to be managed and updated for decision-making. Skills available to test new technologies within a framework of evidence.

Source: Elaborated by authors.

Given below is the pillar-wise breakdown of the average scores of the assessment.

Figure 1: Distribution of average score for five domains of digital education assessment



Source: Elaborated by authors based on 2022 survey results.

Below are the **key insights** gleaned from the analysis conducted for each pillar of the digital readiness assessment.

Pillar 1 – Education Leadership and Governance **The assessment indicates that the strategy for education does not embed digital solutions into Georgia's education reform efforts and hence hinders these efforts as fragmented and one off investments.** The high personnel turnover at the MOES underscores the need for a durable and collaboratively developed strategy for education that

embeds digital components in service of learning. Although the government has expressed interest in developing this, the lack of a well-developed strategy has contributed to ad hoc decisions about programs and initiatives that may not be based on needs and results. There is also a leadership lacuna at different levels in relation to effective data collection, data analysis, understanding of digital goods and services, funding, and requirements of EdTech, and required digital systems for ongoing maintenance and upgrading. The lack of appropriate strategic leadership links to inequitable access to devices and internet connectivity for internet users and an inability throughout the education system to develop thorough digital programs.

Pillar 2 - Enabling Infrastructure. **Meaningful connectivity is inadequate as internet and digital device usage are subpar, attributable to issues of quality and affordability, with high inequity between urban and rural areas. Lack of linkages of digital systems under MOES with whole of govt. shared infrastructure is a key constraint to progress.** The fastest of available internet bandwidths — 50 Mbps via fiber-optic cable — failed to support online learning during school lockdowns. Internet connectivity is inequitably distributed, with high numbers of subscriptions per person in Tbilisi and very limited bandwidth in rural and remote areas. Poor access to devices and low-quality connectivity primarily contributes to the lack of EdTech use. MES does not track either students' access to or usage of mobile networks for educational purposes outside of school. Legislated or regulation-prescribed levels of device use in school and at home are only partially implemented. While the whole-of-govt. digital infrastructure is developing in Georgia, the interoperability platforms and structures are not being linked to education system architecture with likely over commitment of the EMIS.

Pillar 3 - Digitally Enabled Education Service Delivery and Analytics**. As the least developed area identified, the assessment indicates that greater emphasis needs to be laid on identifying the digital and data literacy skills gaps amongst students, as well as the digital pedagogy and digital leadership skills amongst teachers, and school administrators to support the development of the digital education action plans and implement the competency-based curriculum reforms.** Digital skills and data literacy are not systematically measured. Lack of digital skills and data literacy decreases teachers' abilities to integrate technology into teaching and student learning. Although teacher training courses emphasize high levels of technical knowledge, there is a shortage of certified technology teachers. Student requirements for digital skills are described in the Portal of the National Curriculum; however, educational use of computers in schools, whether by teachers using computers to enhance instruction or by students attempting to find information or build skills in their curricula, is not well supported. Georgian repositories of learning resources contain many resources that are less relevant for general-education students' needs and do not offer the digital affordances of networking, flexibility, interactivity to make the materials and their use engaging and interesting.

Pillar 4 - Human Capacity. **In addition to challenges with the aging teacher workforce and low and inefficient level of education spending which affect system capacity adversely, there is a very limited availability of human resources with intermediate and advanced ICT skills to work in MOES and general education digitalization initiatives at regional and local levels.** The curriculum's support for basic and intermediate digital skills development is clearly insufficient. Digital skills in MES entities (especially beyond EMIS) are insufficient for decision-making, policy execution, and monitoring of policies and legislation. Furthermore, access to training in digital skills and data literacy is notably limited for teachers and school administrators, resulting in a deficiency of these essential competencies within school settings. Effectively addressing this gap in digital skills and data literacy is crucial for enabling Georgian society to fully realize its potential as a pivotal contributor to the global knowledge economy.

Pillar 5 - EdTech Market and Business Models **Private sector, particularly SMEs and those operating in the ICT and EdTech sectors, is not intensively involved as a stakeholder in the education system.** MES has no systematic and widely practiced method for ensuring that new digital products or services adhere to inclusivity, quality and safety standards set by the government. Furthermore, there is no established system for tracking usage, effectiveness, relevance, initial costs, and ongoing costs of these digital solutions. While the private sector's stake in the education system is evident, both in terms of its need for a high-capacity workforce and in the effects of increased GDP and economic growth, its involvement is insufficiently supported and inadequate to meet the significant and unique needs of the sector (for ex. availability of services and products in the Georgian language and script). A primary recommendation emerging out of this area is to provide orientation, establish guidelines and conditions that encourage innovative financing and business models, thereby enhancing private sector engagement and improving the quality of education services.

This systemic assessment shows an *Emerging level* of digital readiness of the basic education system in Georgia. Based on the findings of the assessment, three strategic goals for the country's general education system are identified that will benefit from greater digital readiness.

1) ***Promote inclusive and resilient education services to bridge educational disparities*** through greater institutional coordination, targeted remediation, and increased access to digital learning environments both at home and in schools. Give special attention to vulnerable students, especially those from remote, mountain and minority schools with less access to internet and digital resources. This goal aims to create equitable educational opportunities using digital solutions for all students, regardless of their location or status to ultimately reduce the educational inequities and learning loss experienced by disadvantaged students. In the context of multiple ongoing and past challenges (pandemic, war in the region), technology emerges as a key tool to build a resilient system for any future crisis, effectively and efficiently reach the most vulnerable students at scale, with lower marginal costs. Digitally enabled learning solutions offer the potential for establishing school networks for equal access to quality education, greater personalization, allowing for instruction tailored to each student's level, thereby supporting the comprehensive enhancement of the education system. Supporting digital education as a strategic component for enhancing the inclusion and equity in education can also significantly contribute to fulfilling the EU accession agenda for Georgia.

These are <u>not</u> 'digitalization' goals but education goals that will benefit from digital enhancements, keeping in mind that digital solutions are mere tools that need to be utilized effectively to affect outcomes and results. The assessment identified three strategic goals for the country's education system that will benefit from greater digital readiness.

2) ***Enhance the system's effectiveness (quality, relevance, and efficiency)*** by strengthening administrative management, including implementation, monitoring, and evaluation processes that enhance learning outcomes using bidirectional data management and analytics. This includes greater decentralized capacity building across various MES entities and within schools and administrative entities at both regional and local levels. This is essential to complement and enhance the effectiveness of the EMIS agency. To address the high costs of digital-enabled learning (especially high up-front costs), there's a clear need for better collaboration with the private sector, including the adoption of innovative financing models as well as school / municipal level collaboration for enabling economies of scale. These should aim to incentivize cost-effective, localized solutions that are beneficial and affordable for Georgian public education stakeholders.

Finally, ensure that units managing education data and information systems are not overcommitted, interoperability within MES as well as with other ministries and relevant entities of GoG need to be substantially improved. At the highest level of governance and leadership in the GoG, taking this step is perhaps most crucial to ensure that a whole-of-govt. shared infrastructure can be operationalized in the coming decade, but that the MoES plays a proactive role to ensure greater competitiveness of its student base in the local, regional, and global economy.

3) ***Strengthen the management of the teaching profession*** including policies and practices on teacher recruitment, certification and professional development and career growth opportunities. For existing cohort of teachers, adoption of digital pedagogic practices, and enhancing ICT-related training in science, technology, engineering, and mathematics (STEM) needs to be prioritized and well aligned with the ongoing efforts towards whole school development and locally responsive digital action plans at the school and community levels. This must include pedagogic practices including digital pedagogy skills and data literacy competencies. Ensure this by systematically developing and measuring these skills. Georgia needs further reforms in teacher recruitment and management with efficient human resource and performance management system to promote innovations, pedagogic excellence, and meritocracy. Ensure that pedagogical practices—both in person and remote—are observed in classrooms to provide timely feedback and support to teachers to strengthen their professional practice.

The table below outlines a concise overview of key strategic goals along with related recommendations for strategic operational areas, mapping to pillars and priority actions.

Table 2. Strategic Goals, Recommendations and Priority Actions

Strategic Goals	Implementation Recommendations (with mapping to DERA Pillars)	Priority Actions
Strategic Goal 1: Promote inclusive and resilient education services to bridge educational disparities	1.1 Extend high-quality internet connectivity to all schools, with a particular emphasis on ensuring access in rural and mountain schools, to reduce digital access divide and support remote learning opportunities where necessary (*Pillar II: Enabling Infrastructure, Sub-area: Connectivity*).	1.1.1 Enhance Digital Infrastructure: upgrade internet bandwidth and increase access to digital services across all schools, prioritizing rural, mountain and underserved areas. Improve learning facilities, especially where there is a scarcity of certified teachers for better educational outcomes for disadvantaged and minority students.
	1.2 Ensure that all students have access to digital devices (*Pillar II: Enabling Infrastructure, Sub-area: Technology Infrastructure*).	1.2.1 Consider targeted programs to provide devices, connectivity and software to students from low socio-economic backgrounds, those in minority schools and remote areas.
	1.3 Ensure that learners, particularly those disadvantaged, gain foundational skills and 21st-century skills (*Pillar 3: Digitally Enabled Education Service*	1.3.1 Use digital services (such as, i.e. digital student assessment tools, adaptive learning platforms, online tutoring services, Learning Management Systems) to provide

	Delivery and Analytics, Sub-area: Learners).	targeted remediation and learning recovery for students at all grades. This should include regular assessments across all grades using digital tools to understand and address foundational skills as that can adversely affect future learning and earning potential of students. 1.3.2 Prioritize the establishment of school networks for equitable access to quality education via leveraging digital solutions, including improved connectivity and interactive collaboration tools, to effectively reach and support vulnerable students at scale, especially in economically challenged contexts. 1.3.3 Apply digitally enabled tools to personalize education, ensuring teaching is adapted to individual learning levels to facilitate recovery and enhanced learning. 1.3.4 Adopt national standards for digital competency levels among students, educators and citizens, such as the EU's Digital Competence framework, to align digital skilling efforts and facilitate data collection and measurement, addressing key data gaps in Georgia.
Strategic Goal 2: Enhance the system's effectiveness (quality, relevance, and efficiency)	2.1 Develop a vision and strategy document for the digitalization of the education system	2.1.1 Define vision and strategy with specific objectives, actionable plans, estimated budget and robust performance metrics for assessing digital initiatives in education via extensive stakeholder engagement.
	2.2 Enhance digital skills and relevant capacity among all entities within MES through specialized training, collaborative ventures with academia and EdTech sectors, reinforced coordination mechanisms and fostering digital capacity of leadership to stimulate use of advancing digital technologies and internet in teaching and learning (*Pillar 1: Leadership and Governance, Sub-area: Institutional Capacity*).	2.2.1 Strengthen implementation, monitoring, and evaluation processes at all administrative levels, utilizing data management and analytics to improve learning outcomes.

	2.3 Ensure that digital skills, data literacy and digital pedagogy are learned by administrators and measured. Ensure this initiative is supported by leadership-driven organizational and cultural changes at all levels (*Pillar 3: Digitally Enabled Education Service Delivery and Analytics, Sub-area: Education Administrators*).	2.3.1 Build decentralized capacity by expanding capacity building across MES entities and within regional and local school administrations, including enhancing the effectiveness of the EMIS. 2.3.2 Ensure the continued support for development, adoption and effective implementation of the digital education action plans at the school level.
	2.4 Develop incentive mechanisms for raising private sector interest in developing digital education goods, consultancy, and services via access to capital, customers, and mutually beneficial public and private sector partnerships (*Pillar 5, EdTech Market and Business Models, Sub-area: Public-Private Partnerships*).	2.4.1 Enhance private sector engagement by developing innovative financing models and partnerships with the private sector to provide cost-effective, localized digital learning solutions.
	2.5 Implement a robust enterprise-architecture design considering education goals, technology, data and relevant use cases/applications (*Pillar 2: Enabling Infrastructure, Sub-area: Education Enterprise Architecture and Data Governance*)	2.5.1 Enhance Governance by improving interoperability within MES and between various government entities, ensuring a cohesive approach to shared infrastructure and positioning MES as a proactive player in enhancing student competitiveness in the local, regional, and global economy.
Strategic Goal 3: Strengthen the management of the teaching profession	3.1 Upgrade in-service and preservice TPD programs to equip educators with digital skills, data literacy, and digital pedagogy, ensuring these competencies are both taught and assessed. Focus TPD on empowering teachers to effectively utilize digital tools and services in fostering students' foundational and 21st-century skills (*Pillar 3: Digitally Enabled Education Service Delivery and Analytics, Sub-area: Teachers*).	3.1.1 Update policies on teacher recruitment, certification, professional development, and career growth. 3.1.2 Prioritize Digital Pedagogy and ICT Training via focus on adopting digital teaching methods and enhancing ICT training, especially in STEM subjects, for the current cohort of teachers. 3.1.3 Implement a structured approach to develop and assess digital pedagogy skills and data literacy among teachers. 3.1.4 Introduce comprehensive reforms in teacher management, emphasizing efficient human resource and performance management to foster innovation,

		pedagogic excellence, and meritocracy. 3.1.5 Regularly observe and provide feedback on both in-person and remote teaching practices to strengthen teachers' professional skills.

The assessment helped determine the 'as is' state of *emerging* readiness and helped identify critical gaps and opportunities in the pathway to a potential 'to be' state of an *established* digital readiness. Toward this end, the analysis revealed that there are three overarching goals of education, specifically general education, in Georgia—promote inclusive and resilient education services bridging educational disparities, enhance the system's effectiveness (quality, relevance, and efficiency) by strengthening administrative management, and strengthen the management of the teaching profession. Each of these outcomes can be affected by digital strategies, investments, and efforts. The assessment brings out a comprehensive pool of recommendations for each of the five pillars of the assessment framework—leadership and governance, enabling infrastructure, digitally enabled service delivery and analytics, human capacity, and EdTech markets and business models—to aid policy dialogue, planning, and implementation.

The recommendations and actions to achieve these three strategic goals are made to encourage dialogue and stimulate action to move to a more *Established level* of readiness. The challenge is particularly complex in that the education system must digitally transform itself while also building a well-endowed and competitive labor force. This involves advancing the system's foundational and functional digital capabilities to deliver effective and quality services for its students, parents, teachers, and administrative staff**,** both for teaching and learning as well as for pedagogic and administrative management. These recommendation and related actions by pillar are elaborated in Annex 1.

There are critical trade-offs to consider which require not only substantial allocation of resources and time but also close coordination and prioritization between different stakeholders, commitment to a collaborative and strength-based approach, and significant efforts to up the institutional capacity, including using advanced digital skills to implement many of the reform actions.

As critical next steps, **these findings, recommendations, and proposed actions can be utilized for systemically embedding digital solutions in the vision and strategy for Georgia's general education system,** including prioritized actions and costed implementation plan (with legislative teeth, if desired and feasible). Most critically, this needs to be developed through building and consistently leveraging multi-stakeholder engagements, using a variety of tools such as workshops, bilateral and multilateral communication channels, public dialogue, and discourse, amongst others (refer Stakeholder map as a reference in Annex 2). An indicative list of key stakeholders and relevant actors maybe identified to catalyze and influence a dialogue that goes beyond the education system to the wider net of decision-makers, influencers, and broader stakeholders to affect change.

1. Background

This Digital Readiness Assessment (DERA) of the education system of Georgia aims to provide a systemic-level assessment of the main barriers and opportunities for advancing the educational outcomes by adopting appropriate digital pathways. The primary focus of this report is general education, as distinct from early childhood, vocational or higher education. The report emphasizes inclusion of all potential learners in the school population and the need to achieve equity for potential learners in marginalized populations.

The economy of Georgia has performed well over the last decade, growing at an average rate of five percent per year. Georgia presents a radically reduced poverty headcount (5.8 percent of the population earns less than US $2.15 per day), an increasing life expectancy (74 years in 2020), and a steadily improving GDP. The increase in Gross Domestic Product (GDP) has been spread across sectors appropriately as the country transitions from an agriculture-based economy to one in which the service sector is the largest sector and the primary engine of growth (World Bank, 2021A). Nevertheless, the agriculture sector remains rooted in Georgia's rural areas, limiting the pace of development. The World Bank classifies Georgia as a lower-middle-income country.

Georgia stands at the threshold of substantial reforms that promise to enhance its integration into European frameworks. In this journey of transformation, the country faces challenges, particularly in the realm of digital transformation. These challenges include not just skill and competence gaps but also the underdevelopment of digitally enabled education systems. Notably, Georgia's position in global competitiveness and innovation indices underscores areas for improvement. According to the 2019 Global Competitiveness Report, Georgia ranks 91st among 141 countries in innovation opportunities. The 2021 Global Innovation Index places Georgia 63rd among 132 countries, with a score of 32.40, and 61st in the business technology level component. Despite the funding of over 200 technological start-ups between 2018 and 2021, comprehensive measures to enhance access to finance and pertinent digital skills in the country remain insufficiently developed. A critical examination of the ICT labor market in Georgia reveals a shortage of human resources, hindering the nation's ability to meet the demands of both the domestic and international markets. In the context of rapid advances in AI, the nature of skills and jobs is changing. Georgia would need to adapt to remain competitive and integrate better into EU frameworks. The recent groundbreaking EU Law on AI is of high relevance for Georgia (See Box 1).

Box 1: EU's New Landmark AI Law adopted in March 2024

The EU's recent enactment of the AI Law (March 2024) represents a significant milestone in global AI regulation. This landmark legislation introduces binding rules aimed at safeguarding fundamental rights and democracy while promoting innovation and economic growth. By prioritizing safety, transparency, and accountability, the AI Act seeks to mitigate potential harm in various sectors, including healthcare, education, and public services. Key provisions include strict regulations on the use of AI in sensitive areas, such as biometric categorization and emotion recognition, as well as enhanced compliance requirements for high-risk AI systems. The law also encourages SMEs to develop innovative AI solutions by offering regulatory sandboxes and support for real-world testing.

The EU's AI law offers significant implications for Georgia, particularly in light of its EU accession ambitions. Aligning Georgia's AI regulations with EU standards can facilitate smoother integration into the European market, enhancing trade relations and bolstering competitiveness. Compliance with EU regulations may also unlock access to funding and support, fostering the development of AI infrastructure and research initiatives. Moreover, aligning with EU standards can enhance trust in Georgia's AI capabilities globally and promote collaboration with EU member states. By addressing ethical and legal concerns associated with AI technologies, Georgia can build public trust and confidence while advancing responsible AI innovation. Overall, the EU AI law presents an opportunity for Georgia to align its AI policies with international best practices, promoting innovation and progress as it moves towards EU accession.

AI technologies offer both opportunities and challenges for the education sector. AI technologies can facilitate personalized learning experiences, support teachers in various aspects of their roles, and improve accessibility and inclusivity for students with diverse learning needs. Additionally, AI-driven data analytics enable data-driven decision-making, helping policymakers and educators identify trends and areas for improvement within the education system. However, there are also concerns regarding ethical and social implications, including data privacy, algorithmic bias, and the need for digital citizenship education. Ensuring ethical AI governance and providing ongoing professional development for educators are essential to maximize the benefits of AI while mitigating potential risks in Georgia's education sector.

Sources: European Parliament, Euractiv, MIT Tech Review, Atlantic Council, New York Times. World Bank Group, Digital Global Practice - AI Review

Despite the government's effective measures to provide distance education during COVID-19 shutdowns, the pandemic has both accelerated digital transformation and exacerbated the digital divide. This divide has particularly impacted remote schools, socio-economically disadvantaged individuals, those with disabilities, and marginalized groups. As of March 2020, approximately 10% of students lacked internet access and suitable devices for remote learning, with a pronounced urban-rural gap: 82% of urban students had internet and computer access, compared to 70% in rural areas (MES). A Human Rights Watch report in January 2022 highlighted connectivity issues, device shortages, and teacher inexperience in mountainous regions. Furthermore, a study by the National Center for Assessment and Examinations in 2020 disclosed significant disparities in teachers' use and proficiency with digital resources. Teachers in private schools, those in Tbilisi, and those teaching in Georgian were found to be more adept and engaged in using digital technologies compared to their counterparts in public, regional, or non-Georgian-language schools. This disparity underscores the need for targeted interventions to bridge the digital skills gap across different educational settings.

The Government of Georgia (GoG) asserts the importance of human capital as a constituent of economic development and continuous investment in skills and learning in the global knowledge economy with the education system playing a key role in enabling competitiveness and quality. The Government's Development Strategy- Vision 2030, particularly under Goal 6, aims to develop a student-centered, high-quality education system that ensures equitable learning opportunities. A notable element, Objective 6.2, focuses on implementing a student-centered approach in secondary education, promoting comprehensive development. Emphasis is placed on creating a safe, inclusive environment for both physical and digital learning. In line with the strategy 2022-2030, the Ministry of Education and Science (MES) is committed to adopting a longer-term and holistic approach to improve human capital outcomes through developing a lifelong education system for 21st-century skills, driving innovation and entrepreneurship, meeting the needs of future jobs and the digital economy, improving overall education outcomes while benefiting the most disadvantaged and expanding digital technology for better service delivery, transparency, cost-effectiveness, and inclusion.

The pandemic and subsequent reliance on remote learning underscored the importance of adopting relevant digital pathways for greater inclusion, resilience, and relevance of education systems. In many ways, the overall lack of preparedness in Georgia (International Telecommunications Union [ITU], 2021), and in many other countries throughout the world, highlights the importance of the digital transformation of education both as a past need, one that emerged into prominence with the advent of COVID-19, and as a means of future preparedness and resilience (ITU, 2021). Embracing digital solutions in education will meet broader needs as well. At present, there is high demand for knowledge workers with higher-order technical and non-routine cognitive skills in Georgia as well as in countries of the European Union (EU) (World Bank, 2021A). Given the high level of early school leaving experienced in the country with a declining population demographics, the development of digital competencies can enable early school leavers to re-engage and participate in the social and political life of the country (Ivanovic, 2019).

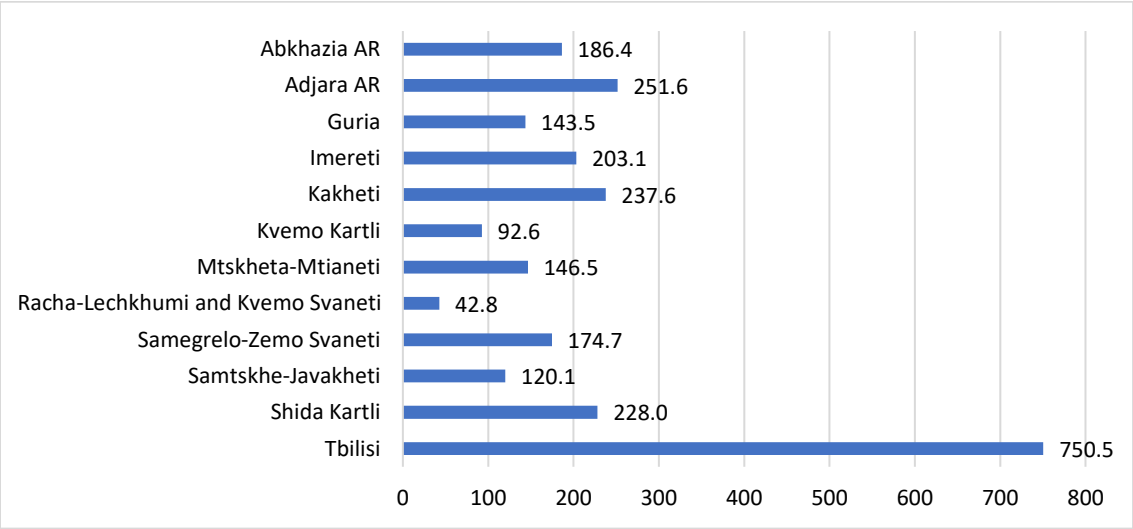
This Digital Readiness Assessment (DERA) of the education system of Georgia aims to provide a systemic-level assessment of the main barriers and opportunities for advancing the educational outcomes by adopting appropriate digital pathways. The primary focus of this report is general education, as distinct from early childhood, vocational or higher education. The report emphasizes inclusion of all potential learners in the school population and the need to achieve equity for potential learners in marginalized populations. The report is written after the COVID-19 school lockdown, which comprised 76 days of full school closure[3].

Education progress and challenges

Georgians enjoy relatively wide access to education, but links to the labor market are weak. Compulsory education in Georgia currently lasts nine years, covering a 6-year primary education (aged 6-11) and a 3-year lower secondary education (aged 12-14). At age 15, students can either continue their general education to complete grades 10 to 12 or may opt for vocational education and training programs. Students with a secondary school diploma have access to higher education. Currently, education is mostly publicly provided with over half a million students enrolled in the system. Access to primary education is nearly universal and enrollment in secondary education is comparable to peers. Yet, according to the 2017-18 Global Competitiveness Report, "inadequately educated workforce" is the single most problematic factor for doing business in Georgia. Like most former socialist countries, Georgia's population is highly literate. Thus, the main issue for employers is not a lack of candidates with diplomas and formal certificates, but a lack of professional skills. Therefore, the issue is not about access to education per se, but access to relevant education and training.

[3] This information is available at data.unicef.org. Data is developed by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

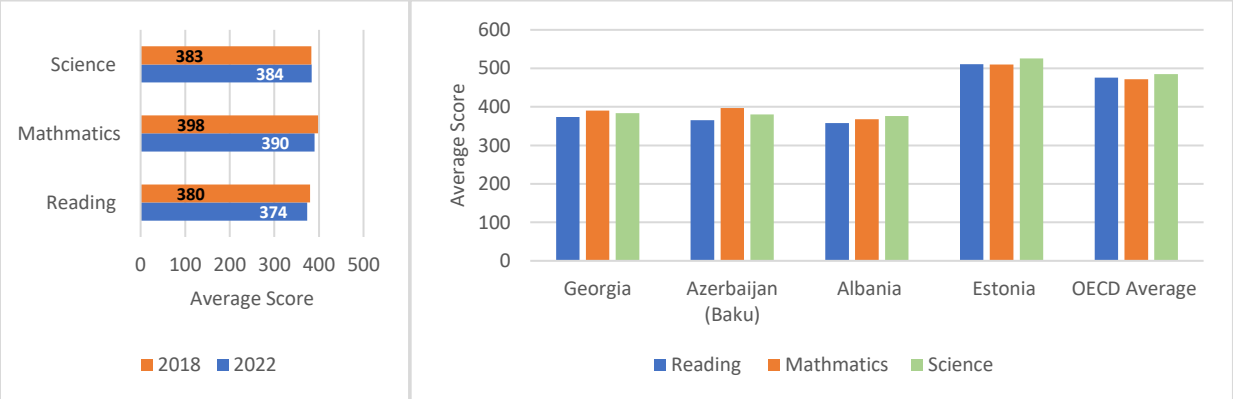
Figure 2. Pupils Per School by Region in 2021-2022



Source: Geostat

Georgia's learning outcomes lag international peers with similar per-capita income. Georgia has achieved near universal participation in compulsory education, reaching a net enrolment rate of 99.4% in primary education and 98.8% in lower secondary education, and 95% in upper secondary education in 2020. Nevertheless, despite this progress, the learning outcomes of Georgian students fall short in comparison to their international peers from countries with similar per capita income, as evidenced by performance in international assessments (PISA). According to PISA 2022, Georgia shows a lower average score in mathematics (390 VS 398) and reading (374 VS 380) and a similar average score in science (384 VS 383) in 2022 compared to its scores in 2018. Despite Georgia still falling below the OECD average in 2022, the reading performance (374) surpasses that of Azerbaijan (365) and Albania (358).

Figure 3: PISA scores in Reading, Mathematics, and Science in Georgia (2018 and 2022) and across countries (2022)

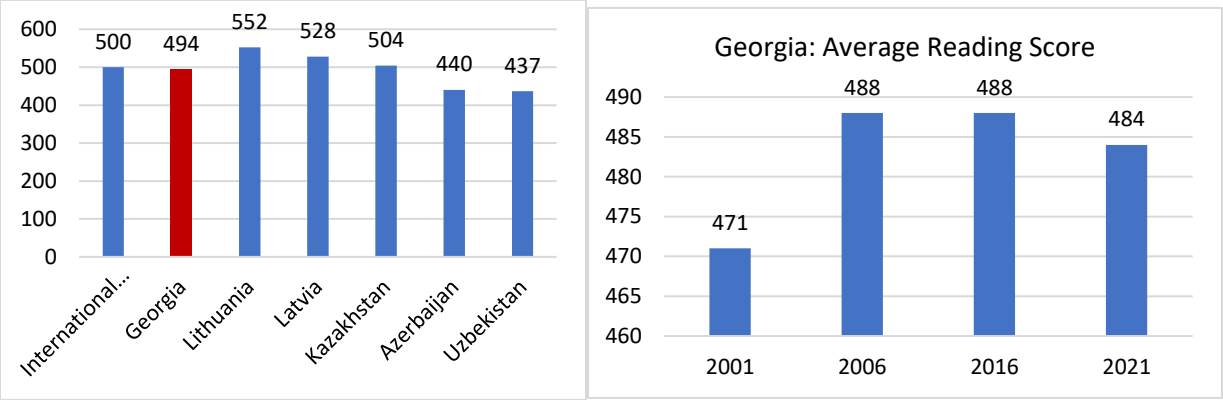


Source: OECD PISA 2018 & 2012

In the 2021 PIRLS assessment, Georgia secured the 41st position among the 57 participating countries. The average reading score stood at 494 points, a figure that falls below both the international

average and the scores of other participating post-Soviet countries, including Lithuania, Latvia, and Kazakhstan. Despite this, Georgia outperformed Azerbaijan and Uzbekistan. Examining historical trends, Georgia has consistently improved its performance across the four participating cycles. However, caution is advised when comparing scores between the 2021 and 2016 cycles. This caution is attributed to the potential influence of data collection on slightly older students, as Georgia conducted late field testing along with 20 other countries in the fall, in contrast to the usual spring season, given the pandemic.

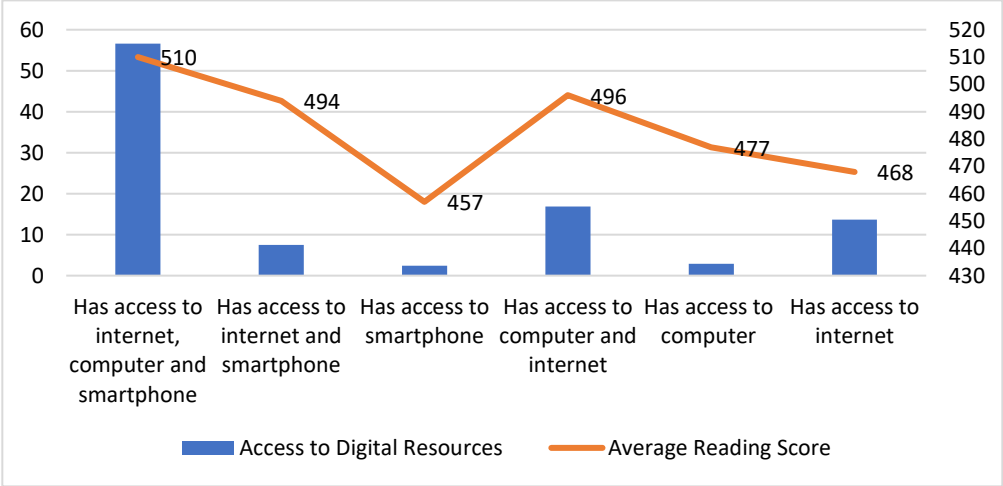
Figure 4: Average Reading Score in Georgia and Comparator Countries



Source: IEA, PIRLS 2021

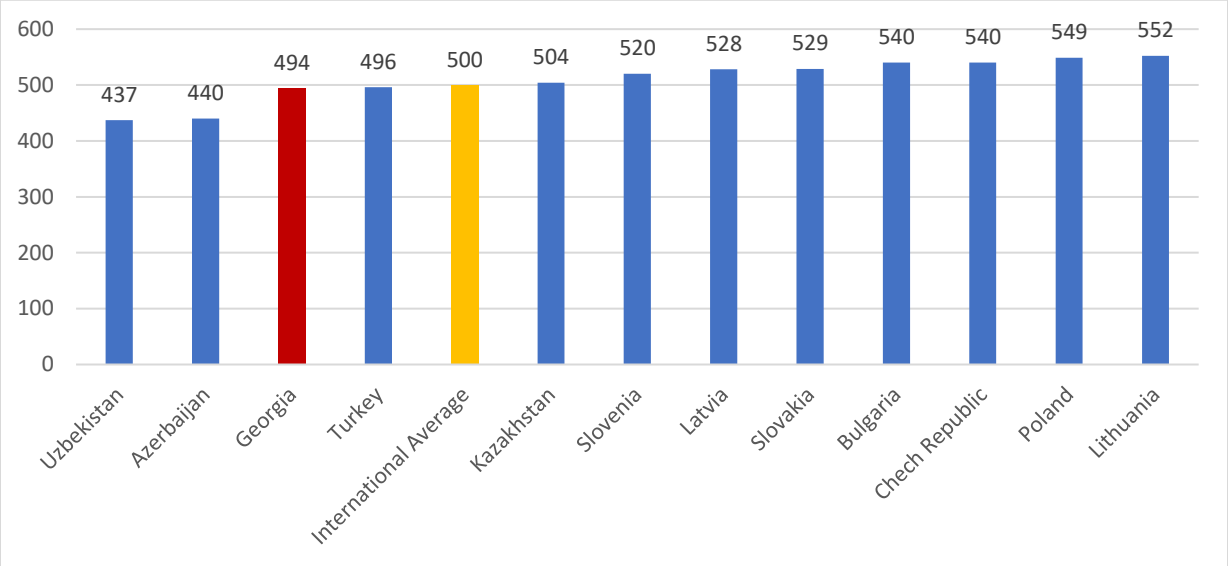
PIRLS 2021 results for Georgia demonstrate a positive associaion between digital resource access at home and average reading scores. Notably, individuals with access to internet, computer, and smartphones demonstrate the highest reading scores at 510 versus the score of students without access to digital resources at 468, suggesting that a comprehensive digital setup positively influences literacy outcomes. The PIRLS 2021 results for Georgia demonstrate a clear positive relationship between home digital resource access and average reading scores. Notably, individuals with access to internet, computer, and smartphone demonstrate the higher reading scores at 510, in contrast to students without access to digital resources who scored 468. Deeper investigation is required for unpacking the causal relationship between a comprehensive digital setup and learning outcomes.

Figure 5: Access to Digital Resources at Home



Source: Georgia PIRLS 2021 National Report, NAEC

Figure 6: Average Reading Score in Georgia and Comparator Countries



Source: Georgia PIRLS 2021 National Report, NAEC

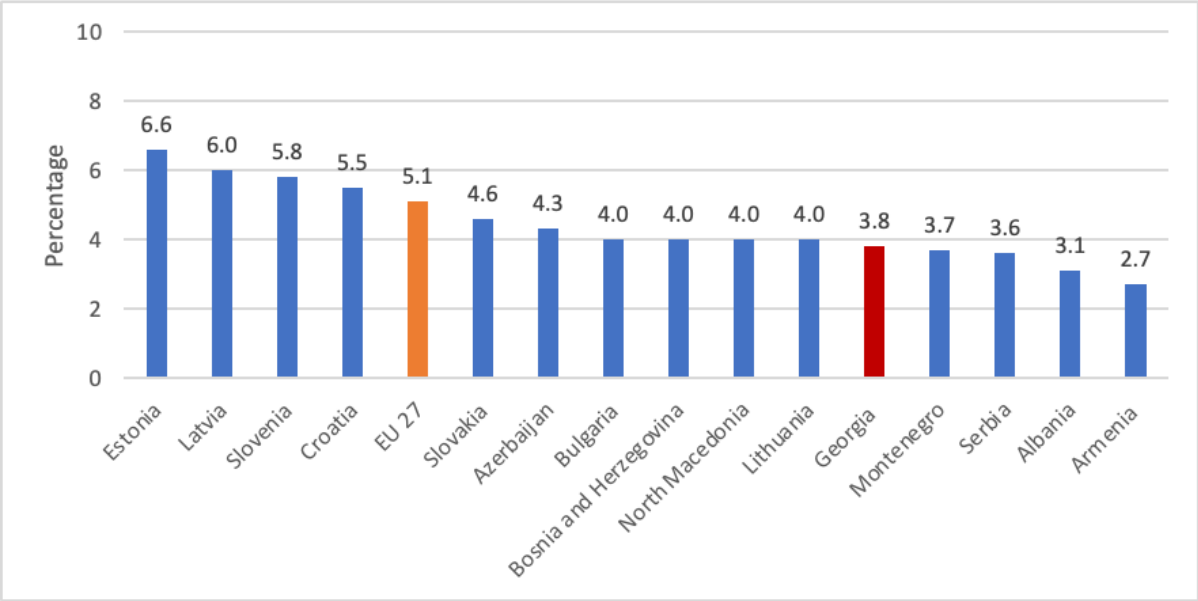
An important reason for these trailing results in PISA performance relates to quality of teaching and learning and the mechanisms available for implementing challenging reforms in the management of the teaching profession in Georgia. In the 2020-2021 Academic Year (AY) there were 2,309 general education institutions in Georgia, of which 2,086 are public schools and 223 are private schools, with 60,000 teachers. However, the teacher population has declined (by about 4,000 teachers since 2019) in response to salaries that are about 40 percent less than the average for all of Georgia (Ministry of Education and Science, 2021). Qualified teachers with ICT certification are insufficient, with fewer opportunities to engage in teacher professional development (TPD). In addition, many of the reforms proposed for the education system in Georgia pose substantial challenges in terms of teacher professional development (TPD), especially in light of an aging teacher corps that can for many reasons resists change (World Bank 2014 and 2021). The certification and hiring of new teachers is highly problematized by these and other factors, which impacts the ability of MES to devise incentives and/or accountability measures to influence implementation. This is further complicated by the mix of centralized and decentralized policies and practices with regards to education financing, procurement policies and accountability structures.

Despite progress made over the past decade, the education sector in Georgia faces substantial challenges due to a shrinking population, with within-country differences by location, availability of school resources, and gender-specific constraints affecting women's choice of STEM occupations. Average school size remains smaller than for all schools in the EU, with a student: teacher ratio of 8.9 about 5 students lower than the EU average (OECD, 2020). Schools range from larger urban schools (many of which are high-performing), to small and very-small rural schools that present challenges in relation to costs and sustainability, as the needs of their local populations change and as they are very often a major source of revenue for its community (World Bank, 2022). Moreover, these trends are expected to continue with 60% of Georgians predicted to live in cities by 2030 due to the high rate of population decrease in villages (three times larger than in cities) and the internal urban migration. More than 70 percent of schools can be categorized as small or very small, for which 65% of all schools enroll less than 25% of the student population (OECD, 2019). Thus, their isolated and remote locations frequently present challenges for high quality and efficient education services for all children, especially those most vulnerable. These schools also tend to have a small digital “footprint” with infrastructural and human-capacity limitations. They frequently fail to contribute data to support recordkeeping and analysis, compounding the barriers to

providing them the support they need (World Bank, 2022). These have impacts on an already poorly coupled education system with the labor market's need for a skilled and innovative labor force, preventing a move from low- to higher-productivity sectors, due to lack of relevant human capital. Female students generally have higher school attendance rates and better test performance than males. However, occupations remain highly gender segmented, with only 16 percent of science, technology, engineering, and mathematics (STEM) occupied by women (World Bank, 2022).

Both GoG's expenditure on education as a percentage of GDP and HCI score are below the EU average[4]. The GoG's expenditure on education, 3.8 percent of GDP in 2020, is lower than countries with similar per-capita incomes and 1.4% lower than the EU average of 5.1%. Estimated total education expenditures as a percentage (3.8) of GDP (estimated at US $16 billion) is US $608 million per year, or approximately US $1,100 per student per year (US $11,200 per student per year for OECD average) (OECD, 2022). Additionally, teacher and administrator salaries account for more than 70 percent of the education sector budget, leaving little space for expenditures directed at curriculum improvements, trainings for teachers, grants for research and development, scholarships for disadvantaged students and capital investments to enhance school facilities.[5] Meanwhile, the most recent HCI data suggest that Georgia has been progressing at a reasonable rate, achieving a score of 0.57 (on a scale of 0 to 1.0) but below the ECA average (0.69) and EU average (0.71). The amount of education expenditure is low given GoG's express interest in becoming a "digital-hub" country, as well as posing challenges to its ability to improve its HCI score (EU4digital, 2020).

Figure 7: Government expenditure on education as % of GDP in 2020



Source: World Development Indicator, and World Bank staff own calculations

[4] Expenditures in the Europe and Central Asia (ECA) region average 5.1 percent of GDP; expenditures for all middle-income countries averages 4.1 percent of GDP as well.

[5] World Bank. 2014. *Georgia Public Expenditure Review: Strategic Issues and Reform Agenda (Volume 1)*. Washington, DC: World Bank.
http://documents.worldbank.org/curated/en/779561468275119198/pdf/781430GE0v10RE0Box0385291B00PUBLIC0.pdf.

Pandemic and learning losses

The COVID-19 pandemic has further disrupted the education system, affecting the future accumulation of human capital. Georgia closed schools for 65 days during the pandemic, almost one-third of the 2019-2020 academic year (World Bank, 2022). The quick transition to remote learning left little time for most students, parents, teachers, and school authorities to prepare. The pandemic and subsequent reliance on remote learning underscored the importance of digitalization. The overall lack of preparedness in Georgia (International Telecommunications Union [ITU], 2021) and in many other countries throughout the world highlights the importance of the digital transformation of education both as a past need, one that emerged into prominence with the advent of COVID-19 and a means of future preparedness and resilience (ITU, 2021).

While a formal assessment of the impact of school closures on learning outcomes in Georgia has not taken place, international evidence suggests that the pandemic will result in substantial learning and earning losses. The population in Georgia faced challenges with remote learning. Microsoft Teams was utilized as the primary remote learning platform to process distance learning; however, 65 thousand pupils and 7 thousand teachers did not use the online study program in 2020-2021. Meanwhile, households did not have enough computers to provide distance learning opportunities for all students. 38% of households did not have computers, and 16% lacked internet access in 2020. Nearly 1.4% of general education school enrollments (602,786 in total) dropped out in the 2019-2020 school year, with 59% being boys. Although primary and basic education is required in Georgia, 42% of students who dropped out were below the tenth grade. Lack of digital teaching/learning devices, incapability of online teaching/learning ability, and unstable internet access are primary factors leading to substantial learning and earning losses, especially for marginalized groups, including poor students, students with special needs, and ethnic minorities. Predictably, the insufficient digital learning environment and teaching staff will lead to learning losses in Georgia (Adeishvili, G., 2021).

Learning lost due to the pandemic closures can lead to losses in earnings for individuals and households and limit economic growth over the medium and long term (Donnelly and Patrinos 2021). These would likely stem from new learning not taking place when schools were closed for extended periods of time and past learning forgotten or lost due to school disengagement and dropouts. This would lead to greater exacerbation of inequalities in education with negative impacts on growth (Psacharopoulos et al. 2020). Earnings losses are also being caused by reduced household incomes for families due to job losses (often faced disproportionately by women who tend to be primary caregivers), a less-skilled labor force, and lower economic growth. Failing to recall and apply past learning and acquire new academic skills and knowledge is likely to reduce aggregate lifetime earnings in present value terms.

Unequal access to the internet emerged as a central challenge in Georgia, with 15 percent of school-age children without access at home, while 48 percent of the population reports that they do not know how to use a digital device (Kasradze and Zarnadze, 2021). Concomitant with school lockdowns, MES launched virtual classrooms on Microsoft Teams accompanied by creation of more than 580,000 user profiles in Office 365 (both teachers and students received licenses). However, per international student assessment results, learning in Georgia was low even before the pandemic led to school lockdowns. One of the main obstacles to effective online learning — in addition to internet bandwidth — was the lack of digital skills on the part of both teachers and students. Inasmuch as students' membership in vulnerable groups decreases their access to distance education, such vulnerability is accompanied by increased learning loss (Kasradze and Zarnadze, 2021).

The rest of the assessment report is structured as follows: Chapter 2 envisages Georgia's next horizon, discussing the potential role of digitalization for supporting improved learning and resilience in a digital era. Chapter 3 provides an overview of the assessment approach, framework and methodology used,

building on existing international and World Bank research, collection of survey data as well as leveraging existing administrative and assessment data. It describes the stakeholder mapping exercise and analysis. Chapter 4 provides the detailed findings and recommendations for each of the five assessment pillars. Chapter 5 provides a summary of the assessment including key insights and overall recommendations. It also provides a draft action plan and discusses the related opportunities and risks. Chapter 7 offers a conclusion statement.

2. Georgia's next horizon

Role of digitalization in education for supporting learning recovery and strengthening effectiveness, inclusion, and resilience

Georgia is committed to the digitalization of its education system, aiming to deliver effective and quality services for its students, parents, teachers, and administrative staff. The country developed a national strategy for digitalization, *E-Georgia strategy, and action plan (2010–2014* and *2023 – 2024)*, guiding digital development. In 2018, a comprehensive general education reform was announced to introduce digital education to all public schools**.** The main objectives of the program included: (i) implementing more diverse digital initiatives in public schools; (ii) guaranteeing continued, high-quality education to all students; and (iii) boosting student creativity by making learning fun and engaging. In partnership with Microsoft and the country's EMIS, the Government equipped computers with software (e.g., Microsoft 365) and offered teachers a series of training workshops. More recently, Georgia's National Broadband Network Development Strategy for 2020-2025 has mandated that schools and public facilities must be provided with internet access at a download speed of 1 Gbit/s by 2025, aligned with both EU plans and Georgia's plan in 5G development. This strategy aims to create infrastructure and establish Georgia as a digital and information hub in the region between Europe and Asia while upgrading knowledge and skills, leading to employment growth (ITU, 2021). In 2022, the Ministry of Education and Science of Georgia adopted its 2022-2030 education sector strategy, targeting the development of a high-quality education and science system by 2030. This strategy focuses on empowering individuals with essential competencies for sound decision-making, contributing to a sustainable and knowledge-driven society.

Box 1. World Bank Engagement supporting digital pathways for education in Georgia

I2Q IPF: In collaboration with EMIS, the project supports the development of Learning Management System, Upgrade of the eSchool General Education and Development of Early Childhood Education software system and the Enterprise Architecture, Data and Domain Models for the EMIS education systems. Overall, the Project aims to improve the capacity of the entire education system to collect, analyze, and disseminate data and information for monitoring and decision-making purposes and interventions. During COVID times, the Project provided JIT support to equip about 433 schools with technologies and around 120 schools with wi-fi connections.

HC P4R: P4R aims to equip 763 public schools (ones with more than 170 students) with all necessary technologies (laptops, projectors, printers) and high speed wi-fi connection, in addition to helping schools prepare and implement their digital action plans. This is the work in process and the first batch of procurements have already been finalized. This is currently a critical activity supporting digitalization at the school level.

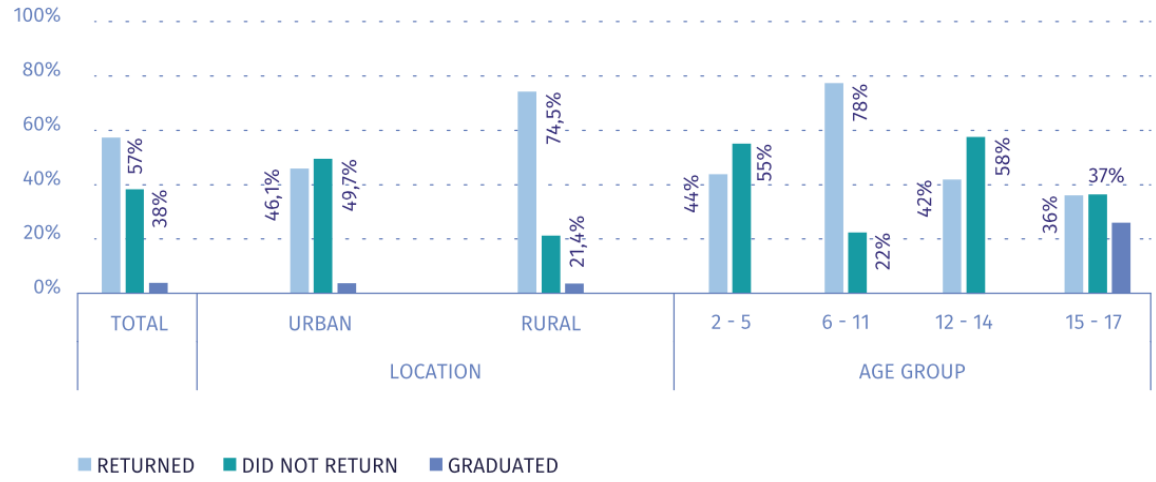
Log-in Georgia IPF: The project aims to increase access to high-speed broadband connectivity for populations in rural areas (up to 1,000 villages), promote the use of select digitally enabled services (including digital public services) among connected populations, and improve the affordability of broadband services across the country.

Source: World Bank

GoG is implementing several digitally enabled education sector initiatives to combat the challenges in general education, supported by World Bank, and other development partners including United States Agency for International Development (USAID), the United Nations Children's Fund (UNICEF), and the Asian Development Bank (ADB). The World Bank's engagement in the education sector of Georgia encompasses two major operations aimed at improving the education system. The Innovation, Inclusion and Quality (I2Q) project, backed by a $107 million investment over six years, is enhancing data-driven decision-making across the education sector. This is achieved through improvements to the existing Educational Management Information System (EMIS), e-school platforms, and the development of a Learning Management System (LMS). During the pandemic, the project also facilitated the equipping of 433 public schools and around 120 schools with wi-fi connections to support effective remote learning. Additionally, the Human Capital Program (HCP), supports schools in the adoption of Digital Action Plans and implementation of self-reflection tools, and equipping up to 763 public schools with necessary technology such as laptops, printers, projectors, and Wi-Fi connections with a commitment of $15 million dedicated to digital learning. A Program for Results (P4R) program provides funds based on the reporting of results by the loan recipient, with approximately US $400 million financing in Human Capital Investment. Complementing these efforts, other development partners have launched a variety of initiatives covering areas such as civic education, media literacy, gender equity in Technical and Vocational Education and Training (TVET), curriculum development, child-centered education, and addressing the needs of Out-of-School Children (OOSC).

While school closures are likely to have amplified and widened the learning inequities in Georgia, it has also presented an incredibly unique opportunity to transform education to be fit for 21st century purposes. The crisis has provided a new impetus and call to action to reimagine and transform traditional models of education delivery to be fit for 21st century purposes. The pandemic has accelerated the need for many long-overdue shifts in education by fueling innovations that ease their implementation, while greatly multiplying the cost of inaction. Before the pandemic, the horizon for any system-level transformation was into the future. However, after the pandemic, there is much greater urgency to ensure education service delivery can leapfrog current siloed and fragmented, provider-focused, one-size-fits-all systems into more integrated, personalized, high-quality, learner and learning-centered systems.

Figure 8. Share of pupils, who returned to school after school reopening (%)



Source: Covid-19 and the Georgian Education Sector, 2021, P49

The global pandemic highlighted the potential of digital technologies in keeping education systems connected and interdependent despite the closure of schools. Adopting remote learning strategies during the pandemic was an emergency response to mitigate the impact of school closures. Despite the difficulties,

the use of technology-enabled students, parents, teachers, and governments to navigate social distancing, minimize service interruptions and ensure learning continuity. The ability to transition to remote learning swiftly and efficiently with minimal disruptions during future crises would demonstrate the resilience of Georgian education systems, for which daily use of digital solutions and skills is necessary for all the relevant stakeholders. Countries with well-established ICT foundations, digital learning systems, and sufficient teaching staff familiar with digital tools adapted to remote learning relatively more swiftly.

Private market penetration and innovation ecosystem

The GoG sees the ICT sector as a priority for the country, both a productive sector and an enabler for economic and social development. The high growth of the ICT sector became one of the main drivers of real GDP growth. Georgia has made significant progress in ICT connectivity towards obtaining "universal and meaningful digital connectivity." An upward trend occurred in the proportion of people using the Internet (from 27% in 2010 to 76% in 2021), families with access to the Internet at home (from 23% in 2011 to 86% in 2021), and families using a computer at home (rising from 18% in 2010 to 64% in 2021). The growth of the ICT sector reached 49.9% in 2022, being one of the main drivers of real GDP growth in 2022. The contribution of the ICT sector to the total nominal GDP has been steadily rising since 2016 and has reached GEL 2,943 million in 2022. The tax incentive has encouraged several major international ICT firms to enter Georgia, and 59% of migrants from Russians and Belarusians are employed in the ICT area, which is the leading reason behind the high growth of the ICT sector. The growing number of employees in the ICT sector has reached 36,707 in 2022 (approximately 3% of the employed population), with the average monthly nominal wage double the average wage in Georgia (PMCG research, 2023).

This growth of the ICT sector must foster transformational changes and greater competitiveness related to organization and innovation in the public and private sectors. The pandemic and its consequences have prompted the government to focus even more on implementing a digital economy, digital education, and promoting digital services to businesses and educational institutions. Despite these achievements, Georgia's position has dropped in some international rankings from 2021 to 2022. Georgia ranked 74th out of 132 economies (11 places lower) in Global Innovation Index, measuring a country's capability to produce innovative outputs, 75th out of 131 countries (7 positions lower) in the Network Readiness Index, measuring capability to use ICT to increase the country's competitiveness and overall well-being, and remained same 79th out of 166 nations in Frontier Technologies Readiness Index, measuring readiness to adopt frontier technologies (PMCG research, 2023).

GoG has succeeded in their efforts to liberalize the telecommunication market and is working hard to establish itself as a growing hub for information and communication technology. In 2019, the electronic communications sector included 285 actors which generated a total revenue of 1,185 million GEL (approx. 318 million EUR), of which 919 million GEL (approx. 246 million EUR) was retail revenue. The retail revenue of mobile operators in 2019 amounted to 499 million GEL (approx. 134 million EUR), where Magticom's market share was 46%, Silknet - 36%, and Veon Georgia - 18%. Concerning fixed Internet service providers, in 2019, 88% of the revenue is generated by three market players: Magticom - 46.8%, Silknet - 35.4% and Akhali Kselebi Group - 5.5%. The remaining 12% is distributed among 136 companies. According to GIZ, 90% of customers of ICT companies were local organizations representing banking or retail sectors and governmental agencies. Many IT companies worked in the online gaming and gambling fields (ITU, 2011).

Digital Whole-of-Government Infrastructure, Foundations and Platforms

Over the past decade Georgia has digitalized cross-sectorally, which bodes positively for education systems to benefit from advancements from digital Whole-of-Government Infrastructure, Foundations and Platforms. E-governance has seen the launch of a multi-channel distribution pathway for e-services, as well as a significant commitment to an open-government approach to those services and

to users' data (World Bank, 2021A). A whole-of-government PFM reform strategy has been implemented throughout the public sector under the leadership of the Ministry of Finance (MoF)[6]. Electronic PFM systems (e-PFMS) are in place and fully operational for budgeting, treasury, and other related areas. These include Treasury – e-State Treasury Electronic Service System, e-Budget – electronic budget management system, e-DMS - Government Debt and Investment Project Management System, TAX – tax and customs administration system, an e-Public Procurement System and e-HRMS – Electronic Human Resource Management System.

Despite a demonstrated appetite for digital transformation through integration and interoperability, there is overwhelming levels of fragmentation and siloed implementation, with unclear linkages and involvement of the education system. For example, the public sector currently has five different document management systems developed by five different government IT offices, three different HR systems and three different cloud infrastructures[7] (World Bank, 2021). There is an urgent and critical need in Georgia for greater strategic leadership with ownership and consistent vision to enable a whole-of-government ecosystem approach to citizen-centered service delivery. Although there are several key agencies and entities there is a huge lacuna in terms of a consistently strong and supportive political environment, durable leadership and champions at different levels of administration and governance, for an integrated governance structure with teeth and legislative authority to systematize the various initiatives, reduce redundancies and ensure greater internal and external efficiency. Moreover, technical specialists in Georgia's MES frequently leave to pursue private-sector opportunities both within Georgia and internationally. Programmers, and in particular those who work in Java or Microsoft's .NET environment are in particularly high demand, making them difficult to employ within MES (European Training Foundation, 2021).

In this dynamic context, to address the urgent needs in education, the general education system in Georgia needs to enhance the system's capacity to provide effective and high-quality services to students, parents, teachers, and administrative staff and improve teaching and learning processes, as well as pedagogic and administrative management through digital means. In line with the Unified Strategy of the Ministry of Education and Science (2022- 2030), the areas of focus include the following: 1) Promote inclusive and resilient education services to bridge educational disparities; 2) enhance the system's effectiveness (quality, relevance and efficiency) by strengthening its management, monitoring, and evaluation processes; 3) strengthen the management of the teaching profession including adoption of digital pedagogic practices, and enhance ICT-related training in science, technology, engineering, and mathematics (STEM); 4) improve inclusion by ensuring increased access to digital learning environments both at home and in schools, particularly for vulnerable and disadvantaged students.

The digitalization of the education system fitting for the 21st century is critical to hasten learning recovery and drastically increase the system's effectiveness, inclusion, and resilience for *all* students. The decentralized education system of Georgia gives schools significant autonomy to proceed with teacher hiring, data management, adaptations to the national curriculum, and management of financial resources from the government. The National Education Management Information System (EMIS) collects school data. The National Assessment and Examinations Centre (NAEC) is responsible for storing assessment data and examining it for students and teachers. Digital technology is not a panacea, and not all education problems can be resolved using technology-based solutions; however, strategic use of technology can have a transformative effect on learning due to its potential to rapidly scale for impact on several identifiable and seemingly intractable challenges.

[6] Georgia: Public Financial Management Reform Strategy (PFMRS) 2018-2021, https://mof.ge/images/File/strategia/2020/PFMRS%202018-2021%20ENG.pdf

[7] A Whole of Government Approach as a Key Foundation for the Digital Economy in Georgia 2021

3. Methodological Overview

Digital Readiness Assessment of Education Systems

The Digital Readiness Assessment for Education roots the analysis in a cross-cutting digital readiness framework for human development[8] that has been adapted for education and covers five pillars: (a) leadership and governance, (b) enabling infrastructure, (c) human capacity, (d) education service delivery and analytics, and (e) EdTech market and business models. For each pillar, readiness is defined at four levels—**latent, emerging, establishing, and advanced.** Each of these levels corresponds to a score between 1 and 4, with 1 representing latent and 4 representing advanced, as was seen in the overview section. The readiness level in each of the five pillars is then aggregated to indicate the mix of investments needed, as defined by the three horizons of digital investments for human development programs[9]—foundational, functional, and frontier investments (World Bank 2022a).

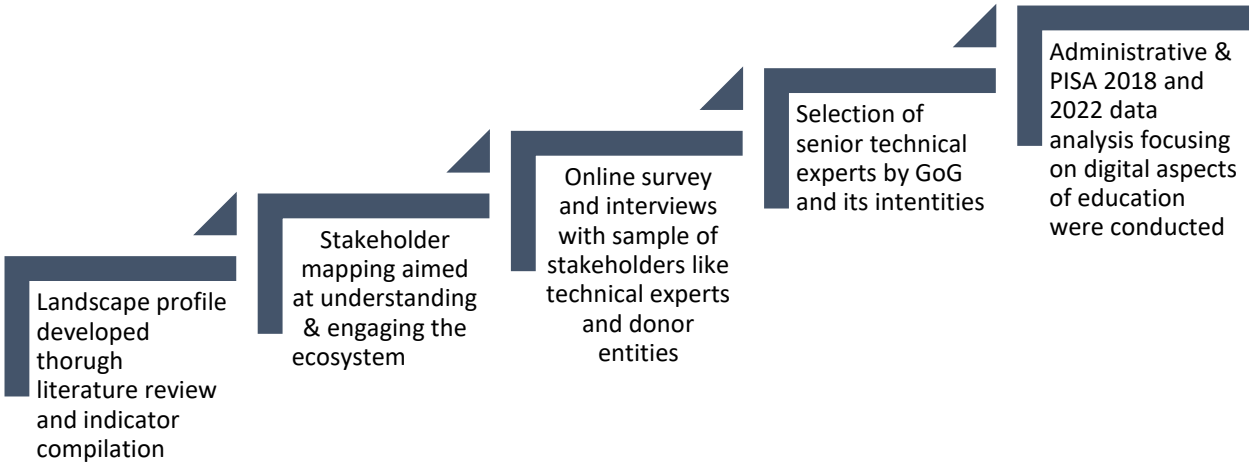
a) **Foundational investments** start with the data and data platforms, such as investments in technology infrastructure, data collection and management, cybersecurity, identification systems, and data governance for individuals, families, and households.
b) **Functional investments** would need to be made in scaling processes and technology platforms that have proven to work and synergistically help meet human capital needs, while supporting proof of concept technologies.
c) **Frontier investments** test new technologies within a framework of evidence as part of a systemwide transformation. Frontier investments include new and creative policies, processes, and technologies that together enable leapfrogging over current ways of working, with an eye toward solving intractable challenges or 'wicked problems' that have hitherto eluded obvious solutions.

Each pillar contains sub-areas that can be analyzed based on the country government's needs, priorities and goals. These sub-areas can be used in the analysis of barriers that need to be overcome in order to attain the digitization of education. This can be done either at the ground level of students, school leaders and teachers, or at a national and local government level or even with other key players in the system, such as EdTech and telecom partners, sector experts, technologists, teacher colleges, innovation hubs, and civil society. In order to conduct a thorough, indepth assessment in Georgia the following methodology was adopted and implemented in the period between April and November 2022 with revisions and updates in the year 2023.

Georgia's digital readiness assessment fo the education system was developed taking a comprehensive systemic approach. This helped (a) identify the relevant reports, analysis, and key indicators on digitalization of the economy and of education; (b) identify the key decision-makers and influencers in the system; (c) triangulate and validate the survey and interview findings against the data analysis to determine the likely level of readiness; (d) compare de jure policies against de facto practices, where possible; (e) determine gaps in awareness, track progress, and develop a holistic picture of the current state of play. Each pillar, and within that each sub-area, can be in a different readiness stage, whereas the overall readiness is in intended to provide a picture of systemic digital readiness. The detailed methodology, scoring measurements, scale, and definitions of readiness levels are elaborated in Annex 2.

[8] This framework is developed after an in-depth review of and harmonization from digital maturity models and frameworks developed by think tanks and the foresight and intelligence units of international corporations, intergovernmental and international organizations, and private sector actors. These include widely used and cited models by Gartner, IBM, Deloitte as well as related outputs by USAID, Broadband Commission, ITU, Omidyar Network, WHO Digital Health Platform Handbook, WEF Digital Culture Guidebook, World Bank Digital Economy for Africa Diagnostic, World Bank Digital Government Readiness Assessment, Global Digital Health Index Maturity model, to name a few.
[9] World Bank 2021 Annual Meeting Human Capital Project Conclave paper, forthcoming.

Figure 9. Methodological Steps



Stakeholder mapping and profile analysis

There are various interest groups in Georgia that shape discourse on digitalization of education. Therefore, for the purpose of this system-level assessment, we have identified the institutions and organizations that are mandated, interested, or considered relevant in participating in education digitization activities (refer to Figure 7). These stakeholders have been categorized as Decision-Makers, Key Motivators/Influencers, Engaged Stakeholders, and Broader Stakeholders (Ackerman & Eden, 2011) and identified on a power-interest matrix. The following (two) ministries, their departments and GoG agencies have been identified as decision-making institutions with a high level of interest and influence on digitalization processes in education: The Ministry of Education and Science (MES) and its following departments: Department of Preschool and General Education (DPGE), Innovation, Inclusion and Quality Project (I2Q) Management Unit (PMU) ; The Revenue Service of Georgia (RS), National Agency for Public Registry (NAPR), Skills Agency – Georgia; Innovation and Technology Agency; and the Ministry of Internally Displaced Persons from the Occupied Territories, Labor, Health and Social Affairs (MOILHSA).

The following (six) GoG agencies and (four) organizations were identified as Key Influencers with high interest and indirect influence on the decisions and actions affecting implementation of digitalization solutions and instruments in education: Economic Department at MES, Education Management Information Systems (EMIS), Teacher Professional Development Center (TPDC), National Assessment and Examination Center (NAEC), Information Technology Agency (ITA within MOILHSA); GOPA Worldwide Consultants - Technical Assistance to Skills Development for Matching Labour Market Needs in Georgia (an EU-funded project).

The remaining participating entities in the study comprise institutes, universities, and other civil society organizations (CSOs). These entities have been recognized as Engaged Stakeholders, possessing the potential to exert direct or indirect influence on the implementation process, including, the national-level institutions such as the National Center for Education Quality Enhancement (NCEQE), (National Center for) Educational and Science Infrastructure Development Agency (ESIDA), Digital Governance Agency (DGA) under Ministry of Justice of Georgia, Information Technology Agency (ITA within MOILHSA), and National Agency for Public Registry (NAPR). It is imperative for them to be aware of the actions and decisions being undertaken to be able to voice their and their community's interests.

4. Assessment Results with Recommendations and Priority Actions

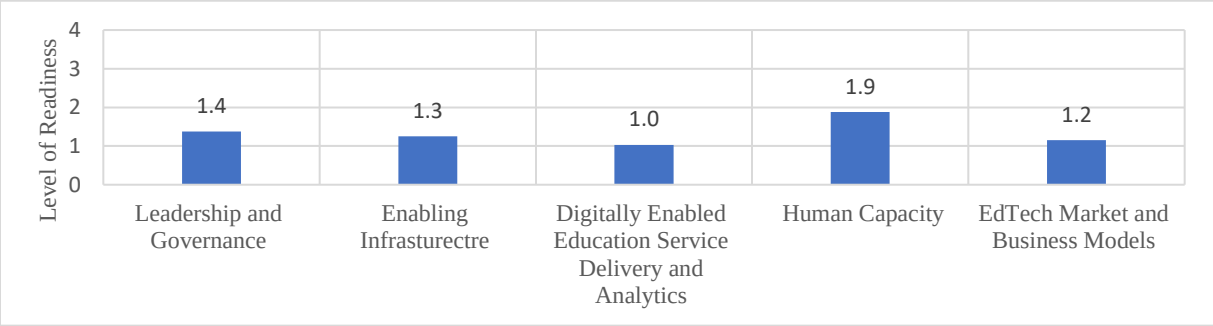
The current level of readiness in the education system for digital transformation is determined to be at an *emerging stage* (Table X). Given below is the pillar-wise breakdown of the average scores of the assessment.

Table 3: Georgia's overall Digital Education Readiness Assessment results

Level 1 – Latent	Level 2 - Emerging	Level 3 - Established	Level 4 - Advanced
Foundational investments that are required for technology solutions to be adopted are lacking and impede further progress.	Foundational investments have progressed, but many issues remain. Functional investments are growing opportunistically.	Foundational investments have taken root and stabilized. Functional investments are used to build evidence to scale systematically. There are marginal opportunities for frontier investments.	Foundational and functional investments are scaled up and continue to be managed and updated for decision-making. Skills available to test new technologies within a framework of evidence.

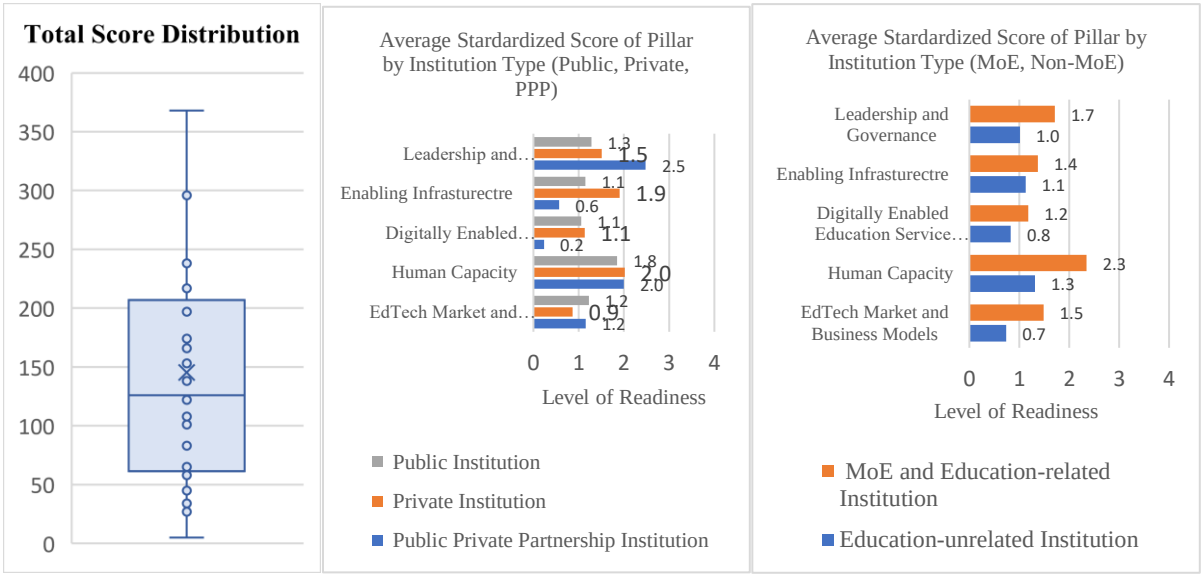
Source: Elaborated by authors.

Figure 10 : Distribution of average score for five domains of digital education assessment



Source: Elaborated by authors based on survey results.

Figure 11: Total score distribution and average standardized score by pillar and institution type



Source: Elaborated by authors based on survey results.

In the following sub-sections, an analysis of the readiness level for each of the five pillars, the scores, a summary of recommendations and key actions for each sub-area are presented. Detailed recommendations and actions are provided in the Annex.

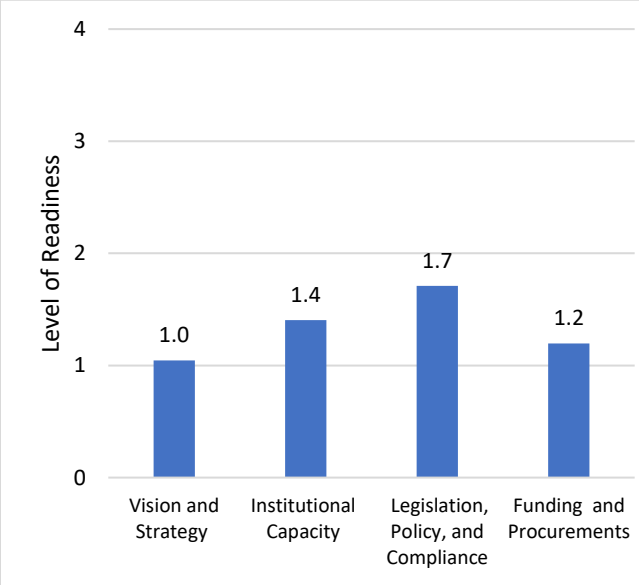
Given below is an analysis by each sub-area under Pillar 1:

Pillar 1- Leadership and Governance

The readiness level for this pillar is determined as **Emerging,** which is assessed against four sub-areas: vision and strategy, institutional capacity, legislation policy and compliance, funding and procurement. The Leadership and Governance pillar focuses on the development of a clear vision and strategy for digitally enabled education systems. To be effective, leadership should be demonstrated at the highest level of government and should be backed by specific government measures. These include relevant and achievable strategies; durable legislation; adequate, equitable, and sustainable financing; procurement mechanisms intended to increase the adoption and scale-up of technology-enabled solutions for education service delivery. Effective and mature leadership identifies and supports champions throughout government, at different levels, and in other sectors. These champions, among their other contributions, help strengthen MES and whole-of-government capacity in relation to digitalization processes in education.

Table 4: Leadership and Governance

Level 1 - Latent	**Level 2 - Emerging**	**Level 3 - Established**	**Level 4 - Advanced**
Low or no governing structures, vision, and plan and low institutional capacity with scarce resources and weak policy and mechanisms for implementing digitally enabled education services.	There is a governing structure with a vision that may/may not be articulated and basic institutional capacity with some resources and mechanisms for implementing digitally enabled education services.	There is a well-defined governing structure with a clearly articulated vision, implementation plan and budgets, and sufficient institutional capacity including resources, talent, and mechanisms for implementing digitally enabled education services.	There is a well-defined governing structure with a clearly articulated collective vision and roadmap, and advanced institutional capacity including champions, experts, earmarked resources, and mechanisms for implementing digitally enabled education services.



Level 2 - EMERGING
Standardized average score 1.4/4

Vision and strategy are not articulated fully, but there is some expressed interest

Basic *institutional capacity* to implement digitally enabled education services with transactional coordination mechanisms

Legislation, policy and compliance for education-related data standards, data governance and cybersecurity, procurement standards, vendor management, interoperability, financing, among others, are in early stages

Financial allocation to education information systems management, analytics, and digital service provision are ad hoc and not consistently costed

A high rate of turnover among MES leadership is compounded by the lack of a strategy for digitalization, leading to priorities that are unknown; initiatives that receive both attention and funding for a period can be deprecated without explanation based on a change in leadership. Survey respondents report that participation in development of the strategic document was ad hoc, review of the strategy yields no reporting of results or changes; respondents have only seen one very-brief (three-page) version of the strategy for review. That version has neither been refined based on comments nor has it advanced through to approval. (Respondents were uncertain about its progress as there is no formal process for review or adoption.) The lack of a strategy to ensure the durability of priorities beyond changes in leadership is compounded by poor data regarding use, performance (in terms of learning outcomes) and cost (in terms of total cost of ownership or TCO). Validation-interview respondents routinely state that the lack of a prioritizing strategy is the primary barrier for the improvement of the education system and students' learning outcomes, including using digital solutions. A high level of variation among responses suggests that greater effort at communication and outreach is required. Although 70 percent of survey respondents identified leadership and governance pillar as an area of expertise, this pillar has a high frequency of "I don't know" responses, suggesting that communication and understanding of programs, policies and regulations is weak.

Given below is an analysis by each sub-area under Pillar 1:

Vision and strategy Despite the government's interest in establishing a digitally enabled education system, a comprehensive vision and strategy have yet to be adopted. The development of a strategy for digitally enabled education is currently in its nascent stage, with the strategy only available in the form of preliminary draft (a-three-page) form. Survey respondents were unfamiliar with the plan, its details or development process. Respondents involved with the review process initially have stated that the document did not include a long-term perspective, desired results or a vision for the future. There is a lack of leadership by MES in relation to effective data collection, data analysis, understanding of digital goods and services, and funding and requirements of EdTech and other digital systems for ongoing maintenance, support and upgrading. There is also a lack of involvement of stakeholders outside MES in the development of the subsector.

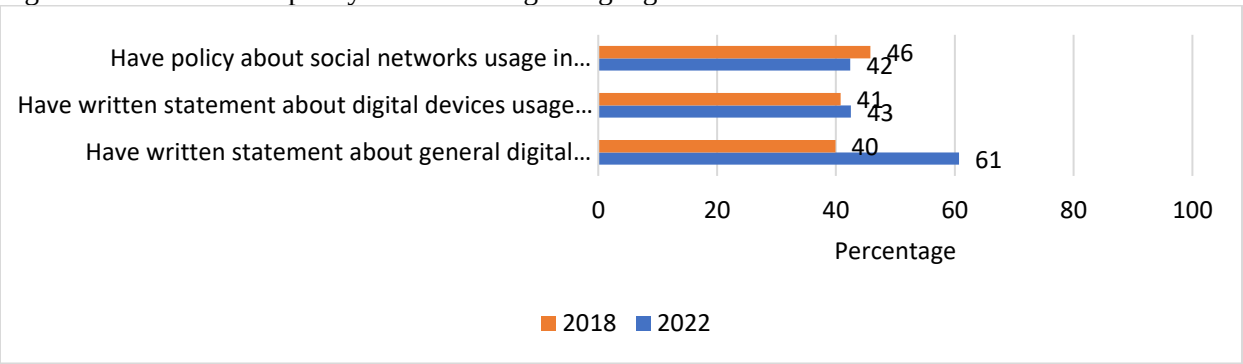
Although a fully developed digital strategy is not yet in place, digitalization in education is highlighted as a focal area in two significant strategic documents: The Government's Development Strategy - Vision 2030, and the Education Sector and Science Strategy covering the years 2022 to 2030. In the Government's Development Strategy : Vision 2030 and MES Strategy 2030 Objective 6.6 underscores the government's commitment to advancing digitally-enabled education through distance and hybrid learning, especially in remote areas and for students without internet access. The strategy targets special educational needs, aiming for digital, hybrid, and flexible teaching models, while addressing barriers in higher education for those with special needs across regions. The overarching vision strongly emphasizes reinforcing distance learning in general education institutions, enabling schools to provide a diverse array of courses tailored to secondary-level students' interests and abilities. Under the Education Strategy 2022-2030, Georgia's Sectoral Priorities I and II place significant emphasis on digital education: Sectoral Priority I focuses on creating high-quality, diverse digital resources and platforms for all education levels, enhancing digital and technological skills, and supporting innovative learning methods. It aims for universal access to digital learning tools and resources across various teaching modes. Sectoral Priority II focuses on fostering equity, inclusion, and diversity in digital learning. It strives to develop inclusive learning environments, advancing social and emotional competences, and prioritizes distance and hybrid learning models, especially for isolated areas and digitally underserved families, including those with special educational needs. The strategy also focuses on supporting vulnerable groups and enhancing educational flexibility, with a strong emphasis on strengthening distance learning in general education.

Institutional capacity Survey respondents indicated that MES had a higher capacity to coordinate with other ministries in GoG than it did within MES and with the many education stakeholders who are "consumers" of the products of the education system. MES has initiated a reasonable level of coordination with other ministries and/or relevant government agencies, but such coordination does not extend to education implementers. The agency of MES with both the highest capacity and the most-extensive mandate in relation to EdTech is the Education Management Information System (EMIS) . The agency undertakes information management of student, teacher, and school records and operates the Learning Management System (LMS) for recordkeeping (e-journal).

Legislation, policy, and compliance[10] Survey respondents reported that MES established relevant regulations. However, these have yet to be communicated widely. As a result, there is both lack of awareness of them and lack of compliance. The existence of legislation stipulating ICT integration into all subject-base courses is moderately well-known by respondents, but this regulation is not observed; certification of IT teachers is required (as part of MES Order 29), again this regulation is not observed. Many regulations are applied internally at an organizational level. Georgia has established a national policy mandating that discounted pricing for connectivity be offered to all students. Legislatively, there is a mandate to provide high-quality connectivity to support education service delivery. Relevant regulations to reduce internet connectivity costs in school, such as zero-rating, bandwidth shaping, reduced tariff plans, and free SIM cards, have not been enacted.

The existence of legislation stipulating ICT integration into all subject-base courses (e.g., mathematics, language arts, etc.) is moderately well-known by respondents. However, as demonstrated in the 2018 questionnaire of the Program for International Student Assessment (PISA), Georgian students' own estimates of the time they spend using technology is so low as to suggest that either most stakeholders are unaware of the law or that they fail to comply with it.[11] This situation notwithstanding, more than half of schools (53.9 to 59.8 percent per Figure), according to their principals, lack policy statements regarding the usage of digital devices.

Figure 12: Schools with policy statements regarding digital devices



Note: n=5572 in 2018 and 6583 in 2022

[10] Georgia has established a national policy, which is framed in the Law of Georgia on personal data protection as well as the Decree of the Government of Georgia, dated December 10, 2020, N2376, which mandates in addition that discounted pricing for connectivity be offered to all students. (It is unknown whether discounted pricing extends to teachers.) EMIS Center is the unit with the mandate for oversight and coordination of this decree.

[11] Survey Question: "Is there legislation to govern the integration of ICT use into school activities?"

Source: OECD PISA 2018 and 2022

Funding and procurements Survey respondents suggested a low level of readiness in the education system for data-based decision-making about items to be procured. Specific programs and departments for digital advancements in education have more secured financing such as digital device provision at Grade 1 My First Computer[12] and EMIS. GoG has developed and mandated the use of a digital procurement tool http://procurement.gov.ge/) in all ministries. However, this tool is used only intermittently because GoG and MES have not taken the steps needed to publicize its existence.[13] There are no protocols requiring data collection on the efficiency or impact of EdTech expenditures nor requirements that procurement is accomplished in accordance with the priorities established by MES or another authority.

Pillar 2 - Enabling Infrastructure

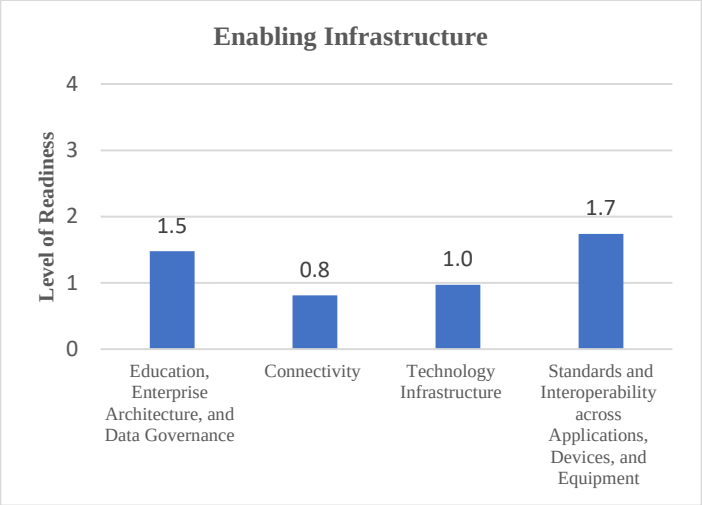
The readiness level for this pillar is determined as **EMERGING (Table 2),** which is assessed against four sub-areas: education enterprise architecture and data governance, connectivity, technology infrastructure, and standards and interoperability across applications, devices, and equipment. This pillar recognizes that aside from the fundamental building blocks of electricity, telecommunications infrastructure, and broadband internet access, which form the ICT backbone, digitally enabled education systems require an enterprise architecture, that is, a coherent, integrated 'blueprint' that aligns business, data, technology, and applications to deliver outcomes, data and technology management infrastructure and oversight, and standards and interoperability across applications, devices, and equipment. This pillar covers the supply side of ICT provision, penetration.

Table 5: Enabling Infrastructure

Level 1 - Latent	Level 2 - Emerging	Level 3 - Established	Level 4 - Advanced
Digital technology infrastructure is not well developed outside key urban areas; mobile broadband coverage is limited; digital enabling environment is less advanced, including data governance, telecom, ID systems, and payments.	Mobile broadband coverage is ubiquitous and extends to rural areas; broadband adoption, quality, and affordability is low especially in rural; ID and payment systems emerging; no education enterprise architecture and interoperability; data governance, cybersecurity and data protection and privacy frameworks in early stages; technology infrastructure for learning is slowly catching up.	Modern broadband infrastructure for rural and urban; broadband adoption, quality, and affordability is growing, with demand for higher service quality (speed); ID and payment systems largely in line with good practices and up to date; education interoperability and enterprise architecture emerging; cybersecurity, data governance, data protection and privacy are developing; tech infra in education is adequate.	Penetration of modern broadband infra is ubiquitous; broadband adoption, quality, and affordability is widespread; ID and payment systems in line with good practices and up to date; cybersecurity, data governance, data protection and privacy are mature; education interoperability and enterprise architecture mature; tech infra in education is adequate and up to date.

[12] My First Computer appears to be an effort on the part of MES to address the lack of access to digital devices among Georgian students (both in-school and outside of school) by distribution of notebook computers to incoming first-grade students. Validation-interview respondents describe a semi-functional program that is unsupported by maintenance or technical support: None of the notebooks are functional after a few years; they swiftly become outdated or they break down and there is no funding for replacement parts.

[13] Alternatively, most respondents are likely not involved with procurement (their status in this regard is unknown) and are for this reason unaware of a required procurement tool.



Level 2 - EMERGING

Standardized average score = 1.2/4

Education enterprise architecture and data governance is emerging, and have substantial room to improve quality data collection to support accurate decisions.

Connectivity to high-quality internet bandwidth is not available at all schools, especially in rural schools.

Technology infrastructure for learning is slowly catching up

Standards and interoperability across applications, devices, and equipment is emerging.

Given below is an analysis by each sub-area under Pillar 2:

Education enterprise architecture[14] and data governance[15] MES has not yet developed or fielded an education enterprise architecture to link investment decisions to relevant information to support implementation decisions with high-quality data and communications. The collection of data in Georgia is reasonably advanced and can support decision-making, albeit there are issues related to data quality, accessibility, and systemic use of data at all levels. Survey respondents indicated that the data quality has substantial room for improvement and a low level of open data sharing within EMIS agencies for review and analysis, leading to duplicated efforts. Currently, the WB-supported I2Q project is aiding EMIS in the development of an enterprise architecture, specifically e-School system. 20 percent of survey respondents selected advanced standardized procedures to ensure data integrity. Privacy of personal data is protected by the law, and identity, cybersecurity, and general data management appear to be well safeguarded. Management of personal information in education repositories appears to be effective.

Connectivity High-quality internet bandwidth is not available at all schools, especially in rural schools, which contributes to an overall inequity between urban and rural schools and to learning loss in rural schools. Poor access to devices and low-quality connectivity primarily contributes to the lack of use of digital solutions in Georgia. MES does not track either students' access to or usage of mobile networks for educational purposes outside of school. The aging nature of the teacher cohort limits the adoption of technology in teaching and learning. Poor connectivity in Georgia — which largely is the case for many schools and for those in rural locations — contributes to an overall lack of equity between urban and rural schools, to learning loss in rural schools and to the under-achievement of students in those schools (Kasradze and Zarnadze, 2021). Situations (such as the low availability of certified instructors) that might be remedied by high-quality connectivity, by enabling "teacher-poor" classes to receive remote instruction, for example, remain unaddressed and unresolved.[16] (See the section, "Digital Devices and Internet Connectivity in Schools," for more information about this issue.)

[14] ***Enterprise architecture*** can be defined as a coherent, integrated 'blueprint' to optimize the often-fragmented legacy of processes (both manual and automated) into an integrated environment that supports service delivery, while being responsive to changes. It provides a common vocabulary to discuss implementation across entities, such as model use cases including development of indicators, ICT workflow descriptions, and ICT building block attributes.

[15] ***Electronic data infrastructure*** refers to the structure and interaction of the major types and sources of data including logical and physical data assets and related data management resources. Data quality (adequacy, accuracy, relevance, explanatory capacity), data flows, storage, protection, standards, interoperability, foundational data such as IDs, birth registries, and so on are often important enabling factors. Electronic education records or any other data assets would capture information regarding a child/teacher/parent's engagement with the education system.

[16] This suggestion was made by at least two respondents in the validation interviews.

Figure 13: Internet Subscribers by region

Region	Household	Subscribers	Penetration rate (%)
Tbilisi	313,576	382,419	121,95%
Adjara A/R	70,500	72,493	102,83%
Kvemo Kartli	106,381	68,734	64,61%
Shida Kartli	90,775	40,243	44,33%
Mtskheta-Mtianeti	30,463	13,493	44,29%
Samtskhe-Javakheti	58,895	25,253	42,88%
Kakheti	115,644	47,770	41,31%
Imereti	145,760	78,789	54,05%
Samegrelo-Zemo Svaneti	118,045	41,532	35,18%
Guria	40,623	8,912	21,94%
Racha-Lechkhumi and Kvemo Svaneti	14,481	224	1,55%

Source: COVID-19 and Georgian education

There are, in any event, relatively steep drop-offs in usage among populations younger than 15 years and those over 75. This information coupled with PISA interview information about EdTech use by students, shows that internet use by people in school, whether school-age children or teachers over the age of 60 (which comprises an over-represented cohort of Georgian teachers) is high. The lack of high-speed internet provision across all regions of Georgia is in part attributable to the high variation in population density which leads to lack of revenue potential in rural areas to balance the cost-benefit. This compounds the digital divides that typify rural/remote and urban dichotomies reflected in schools as well. As a result, internet access is highly unequal. When the education system in Georgia was locked down starting March 15, 2020; during that period, MES offered remote education via e-learning. Validation-interview respondents reported that poor-quality internet kept Georgian students from effective access of classes and resources: *As a mother of four who study on the different levels, usually kids had to turn off their cameras to have a good connection for remote learning. School connectivity was a problem during the pandemic, perhaps because the internet service providers (ISPs) weren't ready for the dramatically increased amount of traffic at the beginning, That traffic was caused by (the combination of…*unknown. *The contracts that were in place could not be adjusted quickly.*

Figure 14: Distribution of broadband traffic

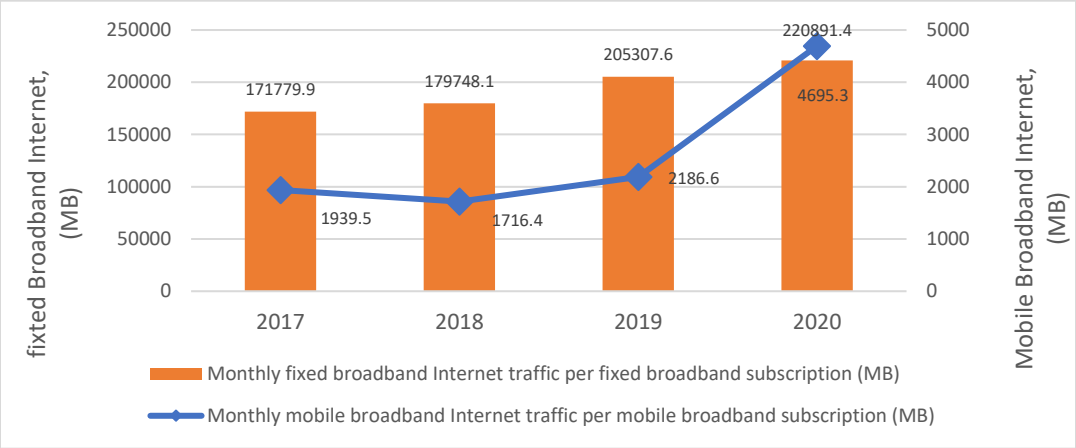


Figure 1:
Source: ITU World Telecommunication/ICT Indicators Database (2021)

The Ministry of Economy is negotiating a Universal Service Obligation (USO) agreement that will include broadband. The USO aims to ensure that all citizens have access to essential telecommunication services, including broadband internet. This initiative reflects the government's commitment to bridging the digital divide and promoting digital inclusion across the country. By implementing a USO agreement that includes broadband coverage, Georgia seeks to extend internet access to underserved and remote areas, thereby facilitating economic development, improving educational opportunities, and enhancing overall quality of life for its citizens. While such an agreement is both essential and welcome, it should include specific mention of schools.

Furthermore, internet connectivity to schools includes the provision of, access to and use of meaningful connections (speed, affordability and reliability). Education often cannot influence on the provision side but should have a stronger role in access and use.

Global best practices highlight several key strategies for access and use of internet in remote and rural areas. These include using innovative technologies, establishing community networks in underserved areas, and implementing government-funded subsidy programs among others to enhance affordability and accessibility.

Good Practices for Access and Use of Internet in Remote and Rural Schools

USE OF INTERNET: The dual teacher/broadcast teacher model: Also known as remote instruction, involves the use of pre-recorded or livestreamed lectures delivered by high-quality teachers to supplement in-person instruction, particularly in contexts where there is a shortage of qualified educators. This model has been successfully implemented in various countries such as Ghana, India, Pakistan, Mexico, China, and Uruguay. In this approach, a teacher is present in the classroom with students while another teacher, either remotely or through recorded videos, delivers the lesson content.

The remote instruction model has shown positive impacts on learning outcomes, especially in rural areas, by providing access to quality education despite limited teacher availability. This model offers advantages such as low-technology infrastructure requirements, modest training for classroom teachers, and potential skill enhancement through observation of remote teachers. Additionally, it enables classroom teachers to focus on more student-centered instruction while remote teachers deliver content, ultimately enhancing the overall learning experience for students (World Bank Group 2023: Using Education Technology to Improve K-12 Student Learning in East Asia Pacific: Promises and Limitations)

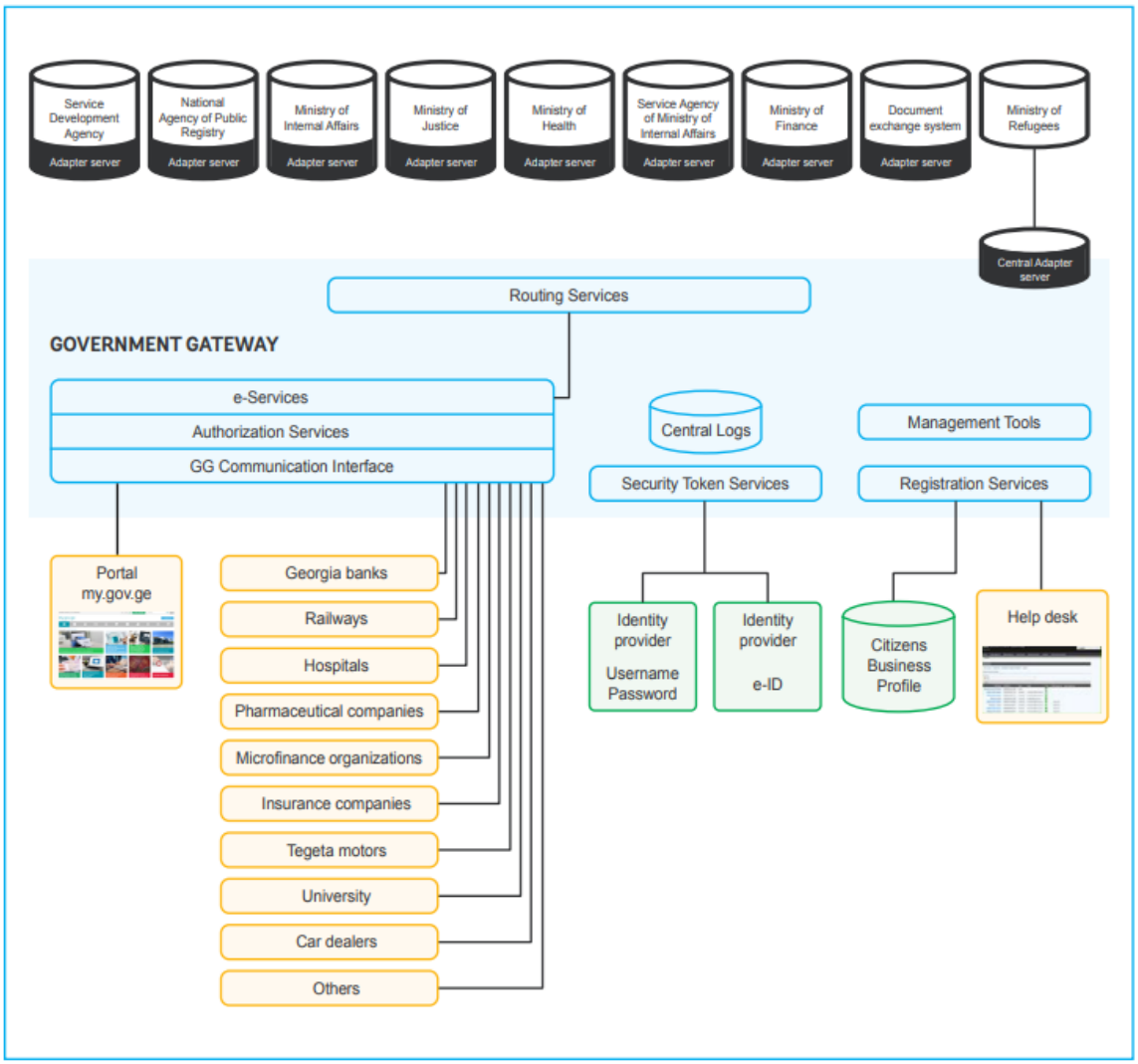
ACCESS:

- **Community Networks:** Community-driven initiatives can play a crucial role in extending internet access to schools, particularly in rural or underserved areas. In Central Asia, countries like Kyrgyzstan have seen success with community networks established by local organizations and NGOs, providing low-cost connectivity to schools in remote regions. These NGOs provide essential resources and assistance, including technical assistance in network infrastructure design and implementation, financial support through grants and funding programs, capacity-building initiatives to empower local community members with the necessary skills, advocacy efforts to raise awareness about the importance of internet access for education, and networking opportunities to facilitate knowledge sharing among stakeholders.
- **Bulk Purchasing and Subsidies:** Negotiating bulk purchasing agreements with internet service providers (ISPs) and providing subsidies can make connectivity more affordable for schools. In Central Asia, countries like Kazakhstan have implemented government-funded programs to subsidize internet services for schools, ensuring widespread access to digital resources for students at a reduced cost.

Technology infrastructure. This encompasses not only devices and a wide range of learning equipment, but all the hardware, software and network infrastructure and its management. These aspects truly help digitally- enable the system for example by enabling the establishment of digital networks (such as an 'intranet'), enabling use of a standardized LMS, which is currently being developed under the ongoing WB-

supported I2Q project, centralized security and maintenance among others. Survey respondents suggested that enterprise technology infrastructure development was in the emerging to established levels, whereas digital device access and bandwidth provision for students in schools and at home are at the "latent" level. Student access to digital devices in schools is extremely limited. In comparison, the existence of a data-exchange network situated in a better status. Legislated or regulation-prescribed levels of device use in school and at home are only partially implemented. Monitoring of access to digital devices is not in place. The laws or policies governing the utilization of hardware and software for children with disabilities or belonging to marginalized groups are very low.

Figure 15: Georgia Interoperability Platform



Source: Georgia Digital Governance Agency, 2021.

Standards and interoperability across applications, devices, and equipment Interoperability of data systems ("ability of different data systems to speaks to each other") across GoG appears no further developed than interoperability in the education system. It is unclear if the Ministry of Education and Science will be plugged into the national interoperability platform. Current procurement of an LMS platform by MES does *not* involve software development but the development of DLRs. As can be noted

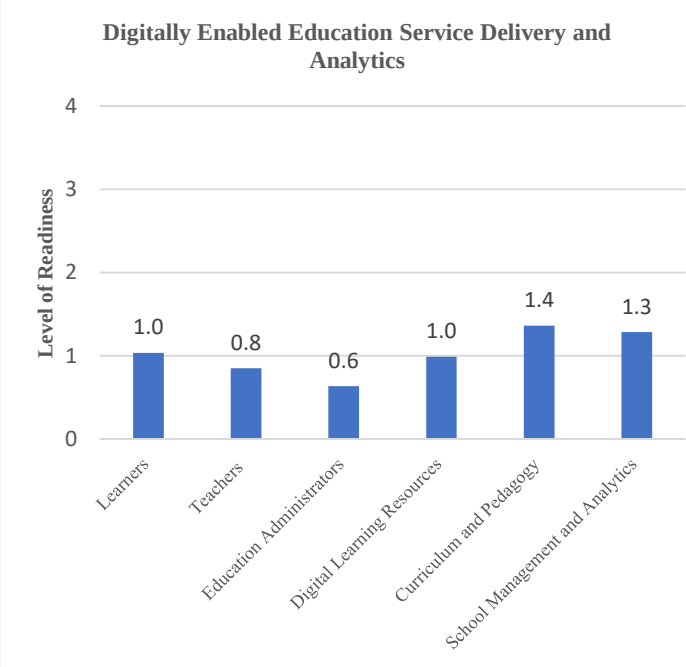
in the below figure, the Georgia Interoperability Platform reference diagram does not include education and skills development (only a reference to University).

Pillar 3 - Digitally Enabled Education Service Delivery and Analytics score

The readiness level for this pillar is determined as **LATENT-EMERGING (Table 3),** which is assessed against six sub-areas: learners, teachers, education administrators, digital learning resources (DTLs), curriculum and pedagogy, and school management and analytics. This pillar focuses on the demand side, that is, learners' and teachers' uptake, use and impact of digital products and services on their learning, consisting of areas in teacher, learner, administrator, curriculum and pedagogy, teaching learning materials, assessments, analytics, and school management.

Table 6: Digitally Enabled Education Service Delivery and Analytics score

Level 1 - Latent	Level 2- Emerging	Level 3 - Established	Level 4 - Advanced
Digital access and digital competencies in school and at home for students, teachers, and administrators is low; curriculum is not adapted; DLRs are very limited, and education data is not digitized.	Digital access and digital competencies in school and at home for students, teachers, and administrators are emerging opportunistically; curriculum adaptation and DLR development is still limited; and education data management is digitized with often one-way data flows.	Digital access, learning resources, and competencies in school and at home for students, teachers, and administrators are widespread and standardized to enable scale and equity; curriculum is adapted and integrated for ICT use; and education data and analytics support feedback loops for decision-making.	Digital access, learning resources, and competencies in school and at home for students, teachers, and administrators are widespread and standardized; curriculum is adapted and integrated for ICT use; and education data and analytics support dynamic feedback loops using frontier technologies.



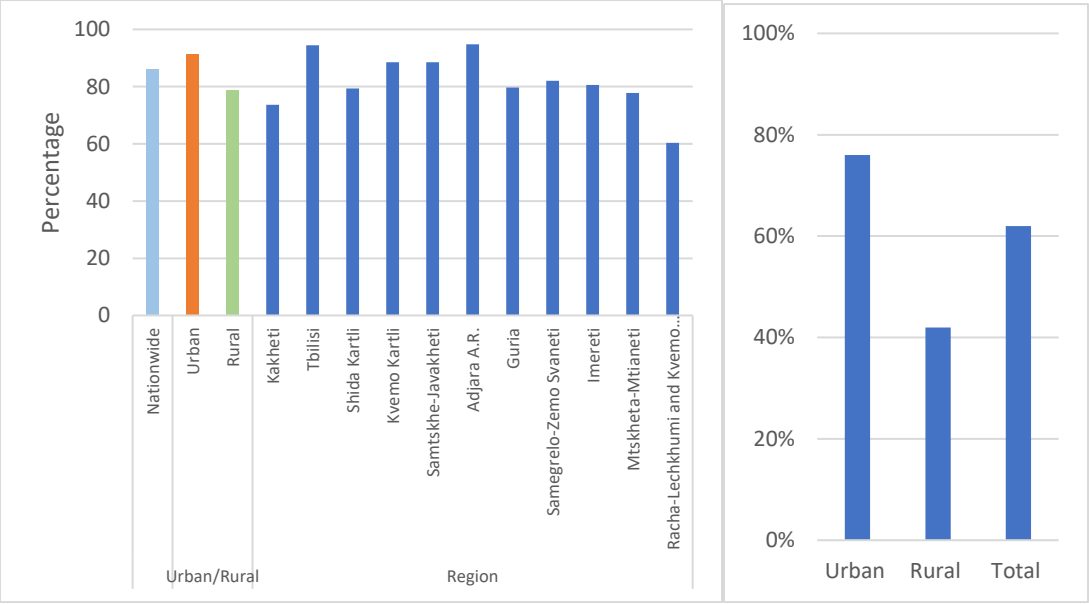
Level 2 - EMERGING
Standardized average score = 0.9/4

Many *learners* have access to digital learning environments, but issues of quality, equity, and efficiency remain
Teachers appear to lack digital skills, and teachers' digital skills are not addressed in teacher education or assessed.
Education administrators have access to digital tools, but application and use are largely opportunistic
There was no procedure for curriculum linkage with the *Digital Learning Resources*, both development and use are limited
Curriculum and pedagogy maybe de jure adapted to incorporate digital skills but limited in practice
School management data are digitized with often one-way data flows, *analytics* are ad hoc reports

Given below is an analysis by each sub-area under Pillar 3:

Learners Most survey respondents estimated that less than 50 percent of Georgian students gain "age-appropriate" digital literacy skills. Better learning outcomes are associated with access to digital learning environments, at school or at home. In remote and rural schools, device provision and internet connectivity lag legal requirements. Students in marginalized populations are not ensured access to low-cost or free digital devices and connectivity at home. Georgian students rank below their OECD peers in their access to and use of digital devices in school. Student requirements for digital skills are described in the Portal of the National Curriculum[17] , comprising six levels, each requiring a two-year study period. Teachers' integration of ICT into subject-based instruction is legally mandated to be applied across all topics and class levels. Digital literacy skills are neither assessed nor required. By most measures of digital development, Georgia lags both its EU neighbors and many developing countries in terms of internet use and digital devices for education. Finally, within the MES curriculum framework as outlined on the curriculum-portal website,[18] digital skills and data literacy appear to be conflated. Data literacy does not, at least as it is presented in the framework, include the ability to determine the value and accuracy of evidence. Without that skill, users are unable to draw on the just-in-time knowledge resources safely and effectively available to them, resources that are changing the nature of education (Fontichiaro, K. and Oehrli, J. A., 2016).[19]

Figure 16: Share of household with internet access and computers at home



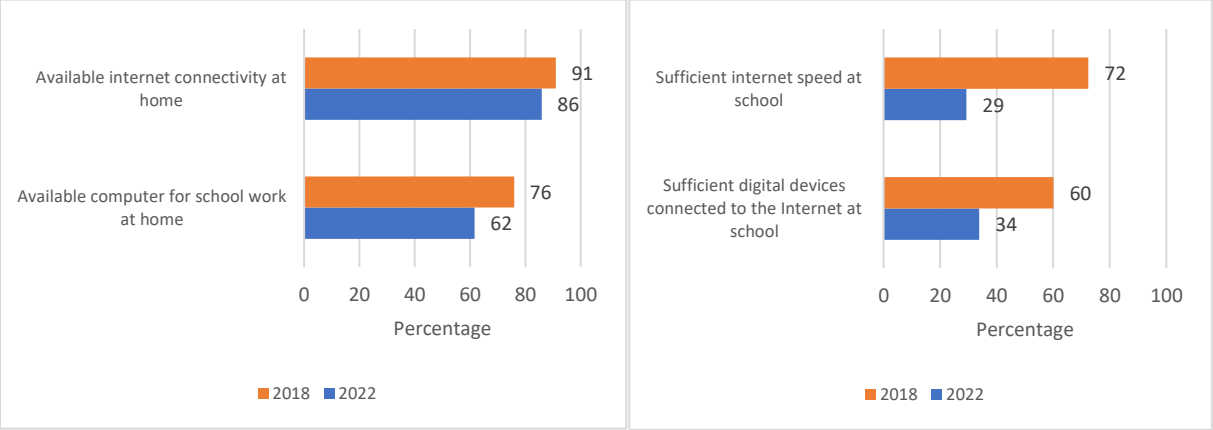
Source: Geostat, 2021; COVID-19 and the Georgian Education Sector

Both home and school digital learning environments are observed through the internet connectivity and digital devices. According to PISA, from 2018 to 2022, there was a decreased percentage of students reporting the availability of internet connectivity (91% VS 86%) and computers for school work (76% VS 62%) at home. Meanwhile, a larger decreased percentage of students reported a sufficient school digital learning environment in internet speed (72% VS 29%) and digital devices connected to the internet (60%

[17] These requirements can be seen at ncp.ge .
[18] Information is accessible at http://ncp.ge/ge/curriculum/competencies/digital-literacy) .
[19] In the majority of respondents' estimations (seven, with 14 selecting "I don't know"), less than 50 percent of Georgian students gain "age-appropriate" digital-literacy skills. Two respondents offered comments linking data literacy to TVET and to the digital skills required to use computer software (e.g., launch a presentation, etc.); one respondent linked digital skills to the European Council's digital-citizenship standard. The first seems to have no bearing on data literacy whatsoever; the second definitely does describe a program in data literacy, however the applicability of this program as suggested by its purpose, to enable students "[t]o communicate, learn, work and play responsibly" in online environments is very high, however digital citizenship is responsibility of all members of society, not only those enrolled in TVET courses.

VS 34%). This may be linked to the high demand for digital devices and faster internet speeds in response to the shift to remote learning during the COVID-19 pandemic.

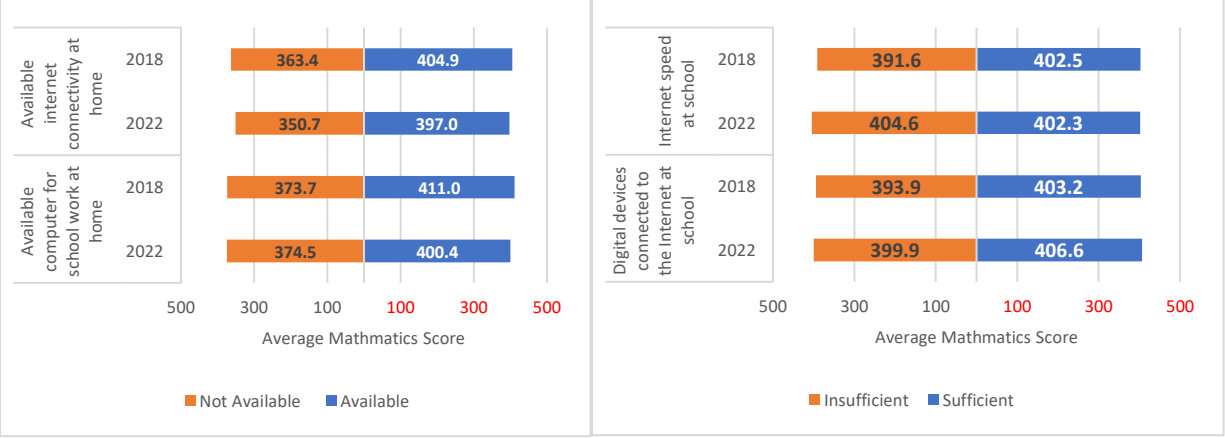
Figure 17: Students' home and school digital learning environments



Note: n= 5,528 in 2018, n=6583 in 2022
Source: OECD PISA 2018 and 2022

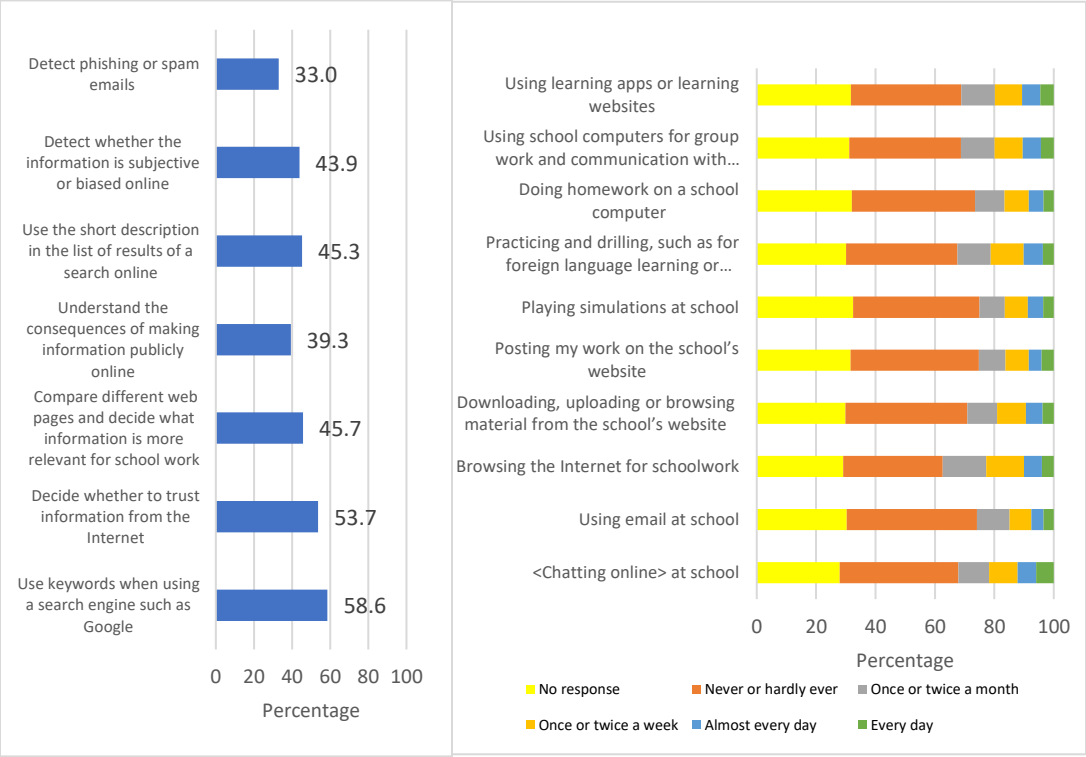
Overall, students in Georgia with access to a digital learning environment both at home and school consistently achieved higher average PISA scores in mathematics compared to those without such access in both 2018 and 2022, except for school internet speed in 2022.

Figure 18: Students' Learning outcomes and home and school digital learning environments



Source: OECD PISA 2018 and 2022

Figure 19: Percentage of students self-reporting data-literacy skills, and frequency of using digital devices at school in Georgia



Source: OECD PISA 2018 database

Teachers The teacher's ability to use digital tools and services in the teaching and learning interactions, in their own professional development and in the pedagogic management of their professional practice is pivotal. However, these applications are not well supported in Georgia. Teachers appear to lack digital skills, and digital pedagogical skills, and there is no objective assessment to determine the skills gaps and related needs. At the school level, the EU SELFIE assessment[20] is being implemented. Moreover, these are also not effectively addressed in teacher education. All schools are obliged to have only certified teachers

[20] EU Joint Research Center's SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational Technologies) tool, which has been initiated in Georgia with support from the Estonian Government.

required under the law, except only if no certified teachers are available. Thus, much of the use of digital tools, appears to be the province of Information Technology (IT) teachers, who are assessed and certified based on core ICT skills rather than digital-pedagogic skills.[21] The lack of certified IT teachers deprives non-IT teachers of coaching and support for integrating EdTech into teaching and learning. The Teacher Professional Development Center (TPDC) offers TPD training on teachers' digital skills, with 40 different courses conducted for in-service teachers and the integration of ICT in education for non-ICT teachers. TPDC has created and published teacher-focused resources in lecture webinars in the field of IT skills without careful monitoring and measurement of its impact. In terms of Certification of ICT teachers, an ICT curriculum is mandated for first, fifth and sixth grades. In addition, the course must be taught — per MES Order 29 — by teachers certified in that subject. However, those requirements create an untenable situation, or one in which requirements must be overlooked. As there are not enough persons who are certified (and who are interested and capable of teaching ICT), schools are obliged to hire teachers on time-delimited contracts and to provide them with professional development.

Box 2. ***Teacher recruitment, certification and digital skills***

All schools are obliged to have only certified teachers, in the subjects delineated by the national curriculum, which in turn is required under the law to be observed by legal entities of public law (LEPLs) or, as are the conditions of accreditation for private-law entities. (These requirements are in accordance with MES order 29.) Exceptions in terms of personnel can be made only if the school management proves that no certified teacher is willing to work in a specific position in their school. In this case, the school is obliged to sign a contract with the instructor for a limited time; after a certain period of time, the school must try to hire a certified teacher. When hiring instructors, the school is required not to exceed the maximum teacher quota (e.g., only 20 percent of teachers may be non-certified).

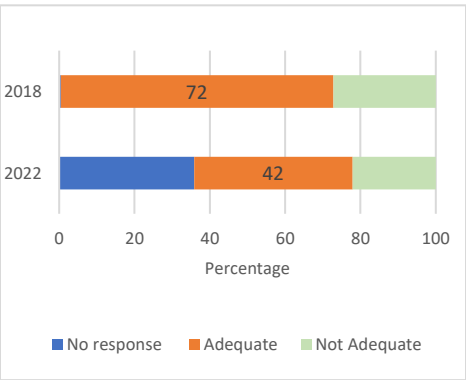
However, attracting certified teachers, especially those with ICT skills, remains a challenge due to various factors beyond salaries, such as the social status of teachers and limited career progression opportunities. WB's recent Public Finance Review indicates that while teacher salaries may not be significantly lower than other professions when considering hours worked, there are complexities in teacher hiring, including retaining staff with IT skills, as they are often sought after by IT firms.

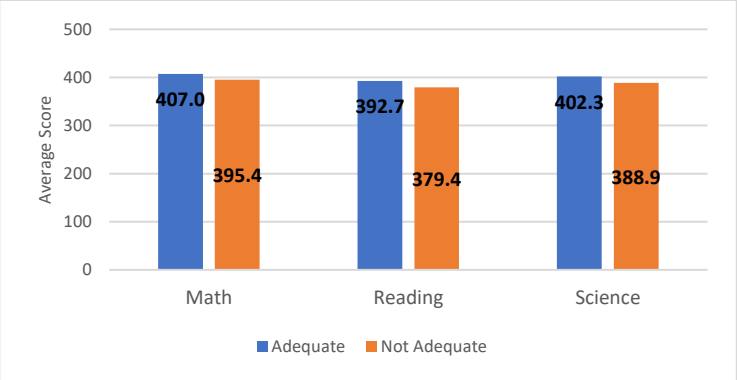
Improving schools' abilities to hire, and to present appealing employment opportunities to, certified teachers and IT teachers is essential.

Teachers' exposure to technology and development of digital skills is currently limited, exacerbating differences in competency levels among teachers once they start their careers. Strengthening pre-service programs will be instrumental to facilitate the general paradigm shift towards digitalization and increase confidence in teachers. A reduced percentage of students reported an adequate number of teachers possessing necessary technical and pedagogical skills to integrate digital devices in instruction from 2018 (72%) to 2022 (42%), of which decline may be attributed to the increased demand for digital teaching skills for remote learning during the COVID-19 pandemic. Students who had teachers with sufficient digital teaching skills achieved higher average scores in mathematics, reading, and science in PISA 2022 compared to their counterparts. The results of these initiatives point to the need to effect holistic change in education, rather than piecemeal change of one element.

Figure 20: Adequacy of digital teaching skills & students' learning outcomes

[21] This comment to question 14 is emblematic: "The state evaluates IT teachers only to give them the appropriate status. This involves assessing the candidate's ICT skills, not digital pedagogy skills."





Note: n= 5572 in 2018, n=6583 in 2022
Source: OECD PISA 2018 and 2022

Education administrators at the school and system level. The number of computers and other devices available for administrative purposes is not adequate and the related information available from EMIS database is inaccurate / insufficient to be useful. Training in digital skills is optional for administrators, and such skills are not assessed. Half of the respondents indicated that administrators may use freely available online trainings and assessments on digital and data skills as per their interest levels with 22 percent stating that this is not a requirement for the role. About 47.8 percent do not know about the assessment tool for administrators whereas 43 percent indicate that no such assessments exist. However, the leadership capability of education administrators at the school level is crucial for creating the enabling environment for embedding digitally enabled teaching, learning and pedagogic practices in the school processes.

Digital learning resources MES has developed several initiatives offering DLRs. The quality of DLRs is perceived as moderate, but their use and effectiveness are not measured. The intellectual property underpinning these resources is protected by the National Law on Copyright and Related Rights. El.ge is the most prominent non-commercial project supporting online learning and the use of digital resources Currently, there about 23,500 resources hosted by the portal. However, an unknown number of these are inappropriate for educational use (i.e., they are "shovelware," etc.) based on their original design for non-educational purposes. Students in marginalized communities have no guarantees to access and use DLRs. No formally adopted standards for DLRs exist.[22] The lack of standards extends to requirements that DLRs be accessible in relation to local language, bandwidth or disability. Many standards and frameworks assessing the quality of DLRs have been developed, including standards that assess inclusivity. Methodical review of these frameworks should enable one or more (depending on their scope and focus) to be identified, adopted and applied.[23] Survey respondents stated that there was no procedure for curriculum linkage with the DLRs. However, two respondents said there was such a system but have yet to use it. In comparison, two other respondents noted that the plan was well-defined and systematically applied. If MES respondents do not know about the linkage requirement, teachers will likely not know about it.

Curriculum and pedagogy

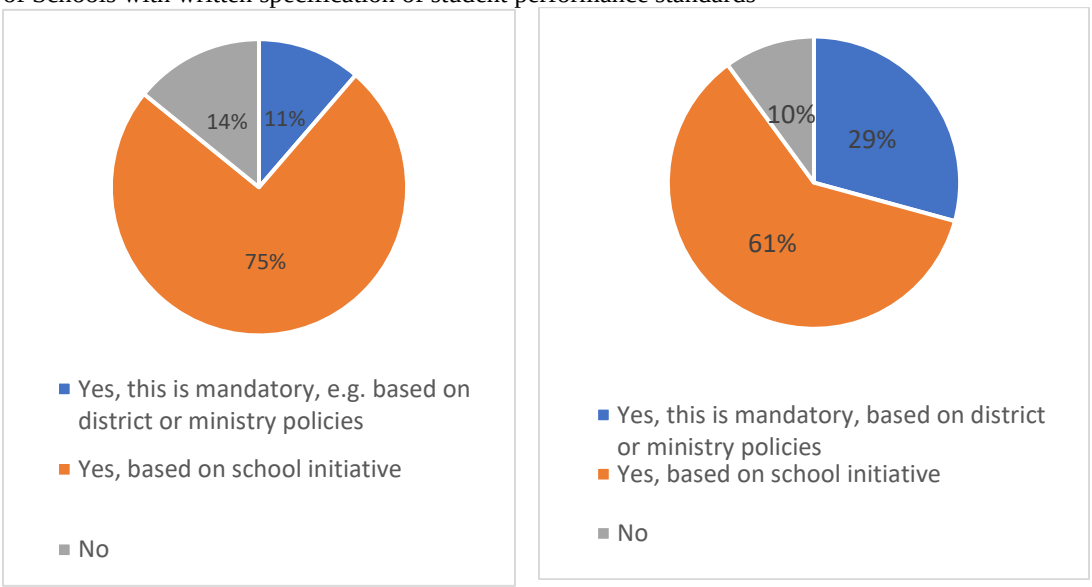
There is a need to modernize current teaching practices and provide more support to teachers to build confidence in the use of technology and experiment with more active and engaging teaching methodologies. This process involves shifting to a more student-centered and inclusive learning environment. Survey respondents noted that the curriculum specified the development of 21st-century skills, but the realization

[22] However "there is discussion" (per three respondents) about development of such standards.
[23] Given the need to translate DLRs into Georgian, it is not unreasonable to suggest the adoption of Open Educational Resources (OERs), which under the CC-BY license can be translated, modified and used (with proper attribution). Several frameworks for OERs are available at https://acrl.libguides.com/c.php?g=819789&p=6835656 .

of 21st-century skill building is substantially lower than is outlined in the curriculum. There are guidelines on the ways that teachers use EdTech, students' opportunities to build 21st-century skills,[24] and whether teachers and students have access to the tools required by blended learning, however, these guidelines are ineffective or not observed. MES has launched a new curriculum emphasizing learner centred approaches and supporting constructivist theories of learning. Constructivism involves adopting pedagogies such as Project-Based Learning (PBL) which tend to embed and leverage the affordances of digital tools and services. As of fall 2023, the MES launched further revision of general education curricula and standards, which provides room for strengthening curriculum and actual teachings for digitally enabled learning. There are currently proposals to increase the practice of formative assessment or Assessment for Learning (AfL) in schools. The National Assessment and Examination Center (NAEC) launched diagnostic assessments in numeracy and literacy in grades 4 and 6 on a pilot basis. AfL generally requires TPD to be effective (Wolternick et al., 2022). Formative assessment has been shown to be supported by digital tools (Elmahdi, I., et al., 2018). In addition, because digital support may decrease teachers' workloads, rather than increasing them (as is common with AfL), AfL can present a promising vehicle for the adoption of digital tools. Assessment tools and resources needed for blended learning is generally poor.

School management and analytics Digital tools are currently required in schools to support administrative functions especially for collection and one-way reporting of data[25] as MES EMIS only accepts information digitally[26]. However, targeted feedback and support to the schools with relevant, timely and aggregate data is missing. Survey respondents suggested that digital tools are required to be used in schools to support administrative functions.

Figure 21: Percentage of schools seeking written feedback from students in lessons, teacher, and resources/percentage of Schools with written specification of student performance standards



Source: OECD PISA 2018 database

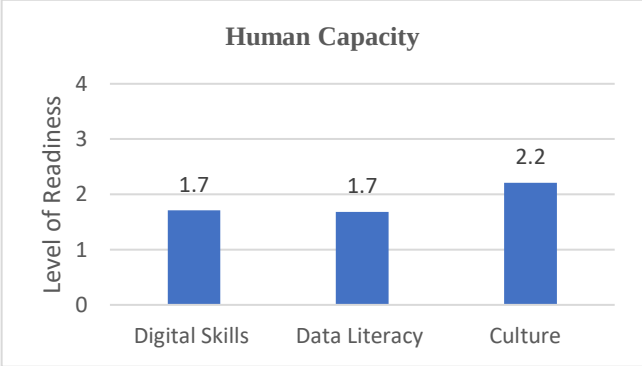
[24] Twenty-first century skills, also known as "soft" skills or "transferrable" skills, include higher-order cognitive activities such as critical thinking, creativity, computational thinking, empathy, communication and collaboration.
[25] Scoring 1.3 among survey respondents, the School Management and Analytics sub-area ranks second in this pillar behind the Curriculum and Pedagogy sub-area. Three questions in this sub-area address the use of EdTech to support improved school management, with the third question specifically addressing the use of EMIS.
[26] The use of EMIS is reported by 12 of 25 respondents, a relatively high number, however the 12 do not agree on the way that EMIS is used.

Pillar 4 - Human Capacity

The readiness level for this pillar is determined as **EMERGING (Table 4),** which is assessed against three sub-areas: digital skills, data literacy, and culture. This pillar covers the knowledge, skills, and capacity of a wide range of stakeholders to collaborate to bring the vision of digitally enabled education to life and an environment that fosters a focus on the service users, incentivizes collaboration and inclusion, and uses evidence to manage change.

Table 7: Human Capacity

Level 1 - Latent	Level 2 - Emerging	Level 3 - Established	Level 4 - Advanced
Digital and data literacy is a challenge among large portions of the population and advanced skills are scarce; collaborative and data-driven innovative practices are not the norm.	Basic and intermediate digital and data literacy is growing; advanced skills are still scarce; collaborative and data-driven innovative practices emerge in small pockets.	Basic and intermediate digital literacy is widespread; data literacy is growing; demand for and supply of digital talent increases; collaborative, data-driven, and user-focused innovations in education are rewarded and promoted.	Intermediate digital and data literacy skills are widespread; consistent demand for and supply of digital talent in both public and private sectors; talent pool and demand for advanced digital skills is growing; collaborative, data-driven, and user focused innovations in education are rewarded and promoted.



Level 2 - EMERGING
Standardized average score = 1.8/4
Curriculum-based support for the development of *basic and intermediate skills* is demonstrably inadequate. but *advanced digital skills* among students was reasonably well established
Culturally collaborative and data-driven innovative practices are moderately supportive

Given below is an analysis by each sub-area under Pillar 4:

Digital skills and data literacy

Curriculum-based support for the development of basic and intermediate skills is demonstrably inadequate for majority of students. Digital skills in MES entities are inadequate for decision-making, project design and management. Such technical skills are in high demand by the private sector, while MES entities have difficulty with both recruitment and retention of personnel with such skills. Survey respondents indicated that the development of basic and intermediary digital skills was low but advanced digital skills among students was reasonably well established, signifying deeper investigation is necessary to unpack potential causes including possible selection bias, pursuance of skills development programs outside school (e.g., coding, digital graphics, database management, etc.). And, finally, it is possible that students gain advanced skills while participating higher education. On data literacy, survey respondents suggested a low level of awareness for data cleaning, analysis and visualization methods with policy decisions made unsupported by evidence. Overall data literacy is likely at an emergent level of readiness, and there are not sufficient data specialists hired in the education system. MES skills in data visualization and interpretation are low, essentially equal to those for data cleaning. Communication among non-specialists and data specialists is moderate. Access to training on digital skills and data literacy is more available to MES personnel than to

teachers or to school administrators. There is an unmet need for additional support in relation to decisions about procurement and to the tracking of resources once they are procured.[27]

Figure 22: Percentage of population reporting never having used the Internet, 2020

Source: GeoStat, IDFI

Culture Support for innovation and learning from failure — two sides of the same coin — are among the most important cultural qualities in the digitalization of education.[28] Stakeholders in the education system must feel comfortable offering ideas, even if those ideas are rejected, and they must try the new ideas they feel strongly about, if the education system is to digitalize effectively.[29] Enabling teacher confidence in adapting to change and modernizing their teaching practice is crucial. Collaboration among education experts is a common occurrence, such collaboration transpires on an *ad hoc* basis or with the support of incentives and other forms of encouragement by MES. Survey respondents suggested that the culture of innovation in the Georgian education system was moderately supportive. Cultural awareness of data quality, data cleaning, and data accuracy are considered as issues. Use cases, user-experience information and evaluation results are essential to effective design. Based on observations on DLR repositories, such as el.ge, such information is neither generated nor considered. Design and development processes must be reconceived to engage the participation of users in ways that are both trusted and valued. The last two questions in the Culture sub-area focus on the innovation ecosystem.[30] Scores in this pillar are substantially higher than responses to similar questions[31] in the Leadership and Governance pillar that relate to policies and legislation that support innovation. It may be that cultural support for innovation is high enough that codification as policy and legislation is unnecessary. However, in the following pillar, EdTech Market and Business Models, financial support for innovative business models receives very low scores (0.5 and 0.7)[32] The implication is that support for risk and innovation on an ad hoc basis is perceived high while formal

[27] Four survey questions in this sub-area address the use of EdTech back-end software to support the procurement of tools and resources.
[28] Question 19 is, "Are innovations and new ideas supported in the education system?"; question 20 is "How do individuals perceive risks and failures associated with innovation?"
[29] Survey respondents in this part of the sub-area suggest that the culture of innovation in the Georgian education system is moderately supportive. (2.6 in terms of support for new ideas; 2.1 for tolerance of failure.)
[30] Again, respondents score the culture of innovation more highly (2.1 and 2.6) in this pillar than they do in the Leadership and Governance pillar (1.7 and 1.0). While we are not able to reconcile these responses with certainty, it is notable that validation-interview respondents chose to start or join private-sector entities. (The composition of the sample should not, however, be seen as representative of the population of former or current MES personnel.)
[31] Question 15 in the Leadership and Governance pillar is "Is there legislation to stimulate and support innovation and related risks for technology adoption and uptake in education?"; question 16 is "Are there policies/legislation to stimulate and support change management, innovation and related risks for technology adoption and uptake in education?"
[32] Question 16 is "Does the business and policy environment allow access to customers (B2B, B2G, B2C) through appropriate business models?"; question 17 is "Do the business and policy environments allow access to capital?"

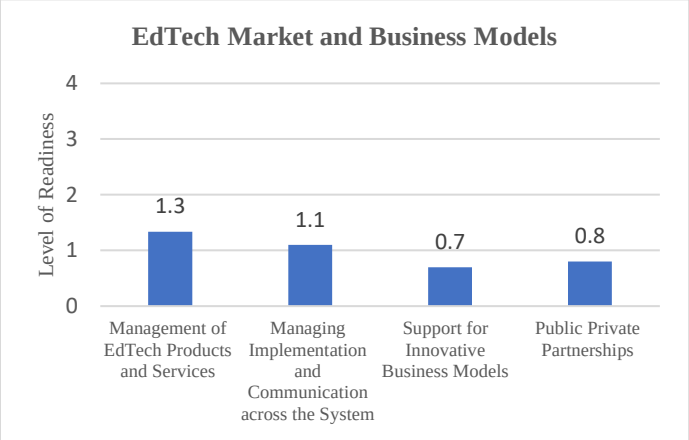
support by GoG or MES is unstructured and, in the perceptions of respondents, very low. Thus, risk and innovation might be applauded by individuals, but lacks systemic support and backing.

Pillar 5 - EdTech Market and Business Models

The readiness level for this pillar is determined as **LATENT-EMERGING (Table 5),** which is assessed against four sub-areas: management of EdTech products and services, managing implementation and communication across the system, support for innovative business models, and public-private partnerships (PPPs). This pillar focuses on the appropriate selection and procurement of relevant EdTech products and services in the market and objective ways of matching these to identified needs. It also briefly covers the support for innovation and equitable distribution of education technology products and services including access to capital and viable business models for the private sector to produce consistent revenues, particularly in the early stages.

Table 8: EdTech Market and Business Models

Level 1 – Latent	Level 2- Emerging	Level 3 - Established	Level 4 – Advanced
Digital services industry/tech sector is practically non-existent including in education; no practice of needs assessments of learners, teachers, schools; and no active management of EdTech tools and services.	Digital services industry/tech sector to service education sector needs is emerging, early stages of EdTech management, such as a library of tools; and ad hoc needs gathering.	There is a vibrant digital education services industry/EdTech sector; EdTech management is systematized with inventory databases and needs assessments.	There is a vibrant digital education services industry/ EdTech sector; EdTech products and services are systematically managed using inventory databases, needs assessments, and vetting and effectiveness measurements.



Level 2 - EMERGING
Standardized average score = 0.9/4

Management of EdTech products and services is not systematized, and intuition-based management approach is generally not based on the collection or analysis of relevant information.

Managing implementation and communication across the system is nascent

Support for innovative business models is limited

Public-private partnerships are rare

Given below is an analysis by each sub-area under Pillar 5:

Management of EdTech products and services Survey respondents suggested that MES's procurement policies appeared to be more established[33]. Similarly, the MES commitment appears to extend to the pilot-testing of new technologies, although the systematic nature of the approach, including the solicitation of feedback from teachers, students and other users is unknown. However, findings in this sub-area, which is scored poorly by survey respondents, point to an improvised or intuition-based management approach not based on the collection or analysis of relevant information. It's unclear to what extent the analysis of users' needs is based on accurate information[34] in relation to implementation effectiveness of policies for procurement and inventory management and tracking of compliance with requirements for accessibility, usability and other characteristics.[35]. MES decision-making with regard to procurement and inventory management is less effective. MES does not have systematically and widely practiced method for ensuring that new products or services meet standards for inclusivity. MES lacks a system for tracking usage, effectiveness, relevance, initial costs, and ongoing costs of Edtech products and services.

Managing implementation and communication across the system Survey respondents indicated the MES generally does not use data to support decision-making about products and services to support understanding of usage rates, effectiveness, and other considerations. MES supports teachers in the implementation of new technologies. However, despite MES support, it is perceived that many teachers neither integrate technology into courses for student use nor use technology in their teaching bringing into question the effectiveness of MES support. Both training and a software backend need to be implemented but remains limited as technical capacity for implementation and responsibility for training development and delivery are located in a single overtasked entity within the education system.

Support for innovative business models Survey respondents suggested a latent business and policy environment for supporting innovation. This limits access to customers through appropriate business models and access to capital. MES appears to be playing a limited role for the private sector, with no availability for innovative funding vehicles and incentivizing market-based actors.

Public-private partnerships The MES does not provide the openness or the willingness to collaborate that are necessary for private-sector involvement. Public-private partnerships (PPPs) are rare in part because regulatory requirements addressing incentives are complex and not well understood.

[33] Question 3 in this pillar is, "How do you know what the needs of the various education stakeholders are, such as students, teachers, administrators, teacher colleges, and accreditation agencies, among others, for technology products and services?" Responses (with a mean standardized score of 2.2) include six respondents selecting the Established response, "C. We collect information from various relevant avenues (e.g., feedback forms, etc.) but the information Is never collected systematically," and six selecting the Advanced response, "D. We use a structured needs-assessment and analysis tool to learn the needs of specific groups and develop action plans and budgets to address these." One of the respondents selecting the Advanced option cautions that it is possible to request information about needs without "allocating the budget" for procurement.

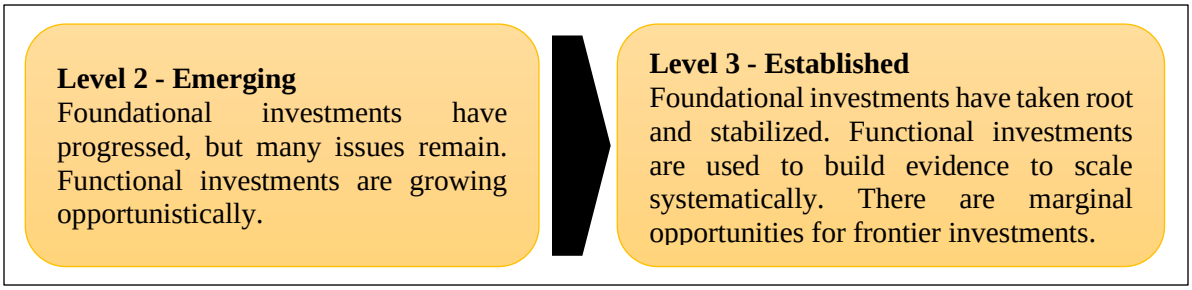
[34] This finding is consistent with results of the validation interviews.

[35] Survey respondents award scores of 1.0 (procurement and inventory management, and (1.0) and inventory management (0.8).

5. Strategic Goals, Key Policy Recommendations and Next Steps

The above systemic assessment shows an *Emerging level* of digital readiness of the education system in Georgia.

Figure 23. Emerging to Established Digital Readiness of Education System, Overall



Based on the findings of the assessment, three strategic goals for the country's general education system are identified that will benefit from greater digital readiness.

These are <u>not</u> 'digital education' goals but education goals that will benefit from digital enhancements, keeping in mind that digital solutions are mere tools that need to be utilized effectively to affect outcomes and results.

1) ***Promote inclusive and resilient education services to bridge educational disparities*** through greater institutional coordination, targeted remediation and increased access to digital learning environments both at home and in schools. Give special attention to vulnerable students, especially those from remote, mountain and minority schools with less access to internet and digital resources. This goal aims to create equitable educational opportunities using digital solutions for all students, regardless of their location or status to ultimately reduce the educational inequities and learning loss experienced by disadvantaged students. In the context of multiple ongoing and past challenges (pandemic, war in the region), technology emerges as a key tool to build a resilient system for any future crisis, effectively and efficiently reach the most vulnerable students at scale, with lower marginal costs. Digitally enabled learning solutions offer the potential for establishing school networks for equal access to quality education, greater personalization, allowing for instruction tailored to each student's level, thereby supporting the comprehensive enhancement of the education system. Supporting digital education as a strategic component for enhancing the inclusion and equity in education can also significantly contribute to fulfilling the EU accession agenda for Georgia.

2) ***Enhance the system's effectiveness (quality, relevance, and efficiency)*** by strengthening administrative management, including implementation, monitoring, and evaluation processes that enhance learning outcomes using bidirectional data management and analytics. This includes greater decentralized capacity building across various MES entities and within schools and administrative entities at both regional and local levels. This is essential to complement and enhance the effectiveness of the EMIS. Given the expensive nature (especially high upfront costs) of digital-enabled learning, there is a strong need for greater coupling with the private sector including innovative financing models that incentivize localized solutions at competitive prices that benefit the Georgian public education stakeholders. Finally, ensure that units managing education

data and information systems are not overcommitted, and there is sufficient *diffusion* of the digital capabilities and knowhow across the system. Interoperability within MES as well as with other ministries and relevant entities of GoG need to be substantially improved. At the highest level of governance and leadership in the GoG, taking this step is most crucial and urgent to ensure that a whole-of-govt. shared infrastructure can be operationalized in the coming decade, and that the MoES plays a proactive role to ensure greater competitiveness of its student base in the local, regional, and global economy. This can be done by ensuring strong and continued support for development, adoption and effective implementation of the digital education action plans at the school level.

3) ***Strengthen the management of the teaching profession*** including policies and practices on teacher recruitment, certification and professional development and career growth opportunities. For existing cohort of teachers, adoption of digital pedagogic practices, and enhancing ICT-related training in science, technology, engineering, and mathematics (STEM) needs to be prioritized. This must include pedagogic practices including digital pedagogy skills and data literacy competencies. Ensure this by systematically developing and measuring these skills. Georgia needs deep reforms in teacher management with efficient human resource and performance management system to promote innovations, pedagogic excellence, and meritocracy. Ensure that pedagogical practices—both in person and remote—are observed in classrooms to provide timely feedback and support to teachers to strengthen their professional practice.

The three strategic goals, related recommendations for strategic operational areas and priority actions (see table 9) are made to encourage dialogue and stimulate action to move to a more *Established level* of readiness. The challenge is particularly complex in that the education system must digitally transform itself while also building a well-endowed and competitive labor force. This involves advancing the system's foundational and functional digital capabilities to deliver effective and quality services for its students, parents, teachers, and administrative staff**,** both for teaching and learning as well as for pedagogic and administrative management. These recommendations and related actions are further explored and elaborated by pillar in an Annex 1 to the main report.

As critical next steps, these findings, strategic goals, recommendations, and proposed actions can be utilized for engagement to help develop a shared vision and strategy for Georgia's general education system, including prioritized actions and a costed implementation plan (with legislative teeth, if desired and feasible). Most critically, this needs to be developed through building and consistently leveraging multi-stakeholder engagements, using a variety of tools such as workshops, bilateral and multilateral communication channels, public dialogue, and discourse, amongst others (refer Stakeholder map as a reference in Annex 2).

The table below outlines a concise overview of key strategic goals along with related recommendations for strategic operational areas, mapping to pillars and priority actions.

Table 9. Strategic Goals, Recommendations and Priority Actions

Recommendations for Strategic Operational Areas (with mapping to Pillars)	Priority Actions
Strategic Goal 1: Promote inclusive and resilient education services to bridge educational disparities	
1.1 Extend high-quality internet connectivity to all schools, with a particular emphasis on ensuring access in rural and mountain	1.1.1 Enhance Digital Infrastructure: upgrade internet bandwidth and increase access to digital services across all schools, prioritizing rural, mountain and

schools, to reduce digital access divide and support remote learning opportunities where necessary (*Pillar II: Enabling Infrastructure, Sub-area: Connectivity*).	underserved areas. Improve learning facilities, especially where there is a scarcity of certified teachers for better educational outcomes for disadvantaged and minority students.
1.2 Ensure that all students have access to digital devices (*Pillar II: Enabling Infrastructure, Sub-area: Technology Infrastructure*).	1.2.1 Consider targeted programs to provide devices, connectivity and software to students from low socio-economic backgrounds, those in minority schools and remote areas.
1.3 Ensure that learners, particularly those disadvantaged, gain foundational skills and 21st-century skills (*Pillar 3: Digitally Enabled Education Service Delivery and Analytics, Sub-area: Learners*).	1.3.1 Use digital services (such as, i.e. digital student assessment tools, adaptive learning platforms, online tutoring services, Learning Management Systems) to provide targeted remediation and learning recovery for students at all grades. This should include regular assessments across all grades using digital tools to understand and address foundational skills as that can adversely affect future learning and earning potential of students. 1.3.2 Prioritize the establishment of school networks for equitable access to quality education via leveraging digital solutions, including improved connectivity and interactive collaboration tools, to effectively reach and support vulnerable students at scale, especially in economically challenged contexts. 1.3.3 Apply digitally enabled tools to personalize education, ensuring teaching is adapted to individual learning levels to facilitate recovery and enhanced learning. 1.3.4 Adopt national standards for digital competency levels among students, educators and citizens, such as the EU's Digital Competency framework, to align digital skilling efforts and facilitate data collection and measurement, addressing key data gaps in Georgia.
Strategic Goal 2: Enhance the system's effectiveness (quality, relevance, and efficiency)	
2.1 Develop a vision and strategy document for the digitalization of the education system	2.1.1 Define vision and strategy with specific objectives, actionable plans, estimated budget and robust performance metrics for assessing digital initiatives in education via extensive stakeholder engagement.
2.2 Enhance digital skills and relevant capacity among all entities within MES through specialized training, collaborative ventures with academia and EdTech sectors, reinforced coordination mechanisms and	2.2.1 Strengthen implementation, monitoring, and evaluation processes at all administrative levels, utilizing data management and analytics to improve learning outcomes.

fostering digital capacity of leadership to stimulate use of advancing digital technologies and internet in teaching and learning (*Pillar 1: Leadership and Governance, Sub-area: Institutional Capacity*).	
2.3 Ensure that digital skills, data literacy and digital pedagogy are learned by administrators and measured. Ensure this initiative is supported by leadership-driven organizational and cultural changes at all levels (*Pillar 3: Digitally Enabled Education Service Delivery and Analytics, Sub-area: Education Administrators*).	2.3.1 Build decentralized capacity by expanding capacity building across MES entities and within regional and local school administrations, including enhancing the effectiveness of the EMIS. 2.3.2 Ensure the continued support for development, adoption and effective implementation of the digital education action plans at the school level.
2.4 Develop incentive mechanisms for raising private sector interest in developing digital education goods, consultancy, and services via access to capital, customers, and mutually beneficial public and private sector partnerships (*Pillar 5, EdTech Market and Business Models, Sub-area: Public-Private Partnerships*).	2.4.1 Enhance private sector engagement by developing innovative financing models and partnerships with the private sector to provide cost-effective, localized digital learning solutions.
2.5 Implement a robust enterprise-architecture design considering education goals, technology, data and relevant use cases/applications (*Pillar 2: Enabling Infrastructure, Sub-area: Education Enterprise Architecture and Data Governance*)	2.5.1 Enhance Governance by improving interoperability within MES and between various government entities, ensuring a cohesive approach to shared infrastructure and positioning MES as a proactive player in enhancing student competitiveness in the local, regional, and global economy.
Strategic Goal 3. Strengthen the management of the teaching profession	
3.1 Upgrade in-service and preservice TPD programs to equip educators with digital skills, data literacy, and digital pedagogy, ensuring these competencies are both taught and assessed. Focus TPD on empowering teachers to effectively utilize digital tools and services in fostering students' foundational and 21st-century skills (*Pillar 3: Digitally Enabled Education Service Delivery and Analytics, Sub-area: Teachers*).	3.1.1 Update policies on teacher recruitment, certification, professional development, and career growth. 3.1.2 Prioritize Digital Pedagogy and ICT Training via focus on adopting digital teaching methods and enhancing ICT training, especially in STEM subjects, for the current cohort of teachers. 3.1.3 Implement a structured approach to develop and assess digital pedagogy skills and data literacy among teachers. 3.1.4 Introduce comprehensive reforms in teacher management, emphasizing efficient human resource

	and performance management to foster innovation, pedagogic excellence, and meritocracy. 3.1.5 Regularly observe and provide feedback on both in-person and remote teaching practices to strengthen teachers' professional skills.

6. Conclusion

Georgian education system must digitally transform itself and be fit-for-purpose for the 21st century by building a well-endowed and competitive labor force. The digital transformation of education involves advancing the system's capability to deliver effective and quality services for its students, parents, teachers, and administrative staff**,** for teaching and learning as well as for pedagogic and administrative management. There are three strategic areas that are ripe for digitalization in the country's education system: 1) support learning recovery through targeted remediation services; 2) enhance the system's effectiveness (quality, relevance and efficiency) by strengthening its management, monitoring, and evaluation processes at all levels; 3) strengthen the management of the teaching profession including adoption of digital pedagogic practices, and enhance ICT-related training in science, technology, engineering, and mathematics (STEM); 4) improve inclusion by ensuring increased access to digital learning environments both at home and in schools, particularly for vulnerable and disadvantaged students. Reform efforts should be prioritized based on urgency and importance to address the above goals while considering the related risks and returns carefully.

The assessment helped determine the 'as is' state of *emerging* readiness and helped identify critical gaps and opportunities in the pathway to a potential 'to be' state of an *established* digital readiness. Toward this end, the analysis revealed that there are three overarching goals of education, specifically general education, in Georgia—recover learning through targeted support for the vulnerable and disadvantaged, enhance the system's effectiveness (quality, relevance, and efficiency) by strengthening administrative management, and strengthen the management of the teaching profession. Each of these outcomes can be affected by digital strategies, investments, and efforts. The assessment brings out a comprehensive pool of recommendations for each of the five pillars of the assessment framework—leadership and governance, enabling infrastructure, digitally enabled service delivery and analytics, human capacity, and EdTech markets and business models—to aid policy dialogue, planning, and implementation. Simultaneously, the clarification of goals and mapping the recommendations to the three identified goals in the current country context will enable the identification of important and urgent actions that can help catalyze a transformation. However, there are critical trade-offs to consider with require not only substantial allocation of resources and time but also close coordination and prioritization between different stakeholders, commitment to a collaborative and strength-based approach, and significant efforts to up the institutional capacity, including using advanced digital skills to implement many of the reform actions.

Annex 1: Pillar-wise recommendations and potential actions

Table of recommendations and potential actions

The table below shows recommendations for each pillar and sub-area and potential actions. TPD, as used throughout this document and in the table that follows, should be understood as including teachers' (pre-service) education.

Pillar 1: Leadership and Governance

The below recommendations and actions have been identified to advance *leadership and governance* from current Emerging level to Established level of digital readiness of the education system

Table 9: Recommendations for Pillar 1, Leadership and Governance

Sub-area	Recommendation	Potential Actions
Vision and strategy	Formulate and gain consensus on a legally binding Comprehensive Digital Education Strategy that integrates with the nation's socioeconomic goals, incorporates precise objectives and key performance indicators to maintain policy continuity and fulfill broad educational agenda.	• Determine primary goals for general education that digitalization will target as per the Education and Science Sector Strategy 2022-2030. • Engage systematically with a broad array of relevant stakeholders (public, private, CSOs, HEIs and Researchers) from various sectors in the digitalization process (not limited to education), establishing clear responsibilities and feedback protocols for target stakeholder groups. • Define vision and strategy with specific objectives, actionable plans, estimated budget and robust performance metrics for assessing digital initiatives in education via extensive stakeholder engagement. • Advocate for supporting legislation to ensure execution of the digitalization strategy, adherence to the proposed schedule for its development or to ensure compliance with it, such legislation should be requested, and its drafting supported by MES. • Plan and implement a communication program. with specific initiatives for each group of stakeholders as well as indicators that support M&E. • Support the development and implementation of schools' digital action plans. Georgian schools are required to develop action plans for digitalization and school improvement. Support for these plans can include the provision of templates and/or information resources. Develop trainings for 'school teams' and for school leaders to build extensive capacity for developing and implementing the digital action plans. These plans should be backed by resources and supports for implementation. • Monitor progress in relation to the MES plan. All activities should be measured in relation to their costs, impact, objectives and other factors.[36] Information resulting from these measurements

[36] Practical information about M&E can be found at https://evalpartners.org/ . Also, please see https://www.oecd.org/dac/evaluation/daccriteriaforevaluatingdevelopmentassistance.htm for essential information about the Development Assistance Committee (DAC) criteria.

		should be made available to education-system decision-makers and to all citizens of Georgia.
Institutional capacity	Enhance digital skills and relevant capacity among all entities within MES through specialized training, collaborative ventures with academia and edtech sectors, reinforced coordination mechanisms and fostering digital capacity of leadership to stimulate use of advancing digital technologies and internet in teaching and learning.	• This step might require re-chartering or re-structuring the EMIS Agency; that step and others related to it are addressed in detail in the report, "EMIS, data integration and analytic systems" (World Bank, 2022). A proper approach to digitalization will require individuals with high levels of digital skill and/or data literacy, plus engaged leadership across the whole of the MES, including NCTPD. An approach to staffing could involve secondments or other forms of resource reallocation (e.g., transfer). • MES leadership must have experience using digital devices, must be data literate, as the interpretation of information is required, and must be familiar with concepts related to the cost and sustainability of EdTech initiatives, such as Total Cost of Ownership (TCO), e-waste and other factors. This includes assessing digital skills of all relevant MES personnel, developing training and/or coaching programs as needed; deliver and re-assess to determine the effectiveness of training (or conduct M&E). • Perform a swift evaluation of the digitalization needs in schools, focusing on the perspectives and requirements of students, teachers, and school administrators as the end users. • Improve MES internal coordination emphasizing enhanced collaboration among different departments of MES, key agencies and key education stakeholders. • Widen coordination to actively involve education implementers, ensuring their requirements and input are well-integrated with MES's strategies. • Identify and promote influential staff within the education system to serve as digital "champions" to actively showcase the use of digital services in educational contexts.
Legislation, policy and compliance	Improve evaluation and enforcement of all regulations and legislation to facilitate adoption of digital technology in education.	• Map all education-related regulations and laws, noting their data flows; identify issues along with their related priority and feasibility level (connectivity, EdTech integration, accessibility, certification of ICT teachers, etc.. • Advocate, develop and adopt stronger and clear data interoperability related legislation for Whole of Govt. including for education to enable a life cycle approach to data management and analytics and to support evidence based decision making • Develop and communicate clear policy guidelines that outline objectives and standards for digitally-

		enabled education including aspects of data privacy, quality standards and accessibility. • Adopt assessment tools for establishing the level of schools' digitalization. Based on the results, schools must develop internal action plans for raising the level of digitalization, stimulating a bottom-up approach. • Develop and implement innovative government programs or schemes through which funding is available for the private sector to invest in education ICT or digitalization of education services, applications, infrastructure. Elaborate clear technical and programmatic specifications on such digital initiatives in education. • Develop and implement mechanisms to evaluate digital applications and products in the education system for their appropriateness, feasibility, utility, and effectiveness.
Funding and procurement	Ensure EdTech procurement strategy is based on relevant data, applies government digital tools and evaluation protocols, and promotes affordable and sustainable financial models to boost private sector involvement and EdTech funding.	• Collect and assess impact and performance data from all education goods and services to inform procurement decisions; • Determine a procurement formula that integrates funding, identified priorities and impact and performance data; • Ensure that decision-makers have data-literacy competencies and full understanding of both capital and operations costs, and; • Link procurement actions to a dashboard for M&E, and publicly share procurement decisions. • Assess and report on all existing costs, funding sources, and amounts, ensuring a thorough understanding of financial resources. • Conducting advocacy at the highest levels of GoG to secure and protect budget allocations for both existing and projected initiatives; • Make decisions based on impact information to increase funding for high-priority programs and guide funding decisions towards the most impactful digital goods and services for education.

Pillar 2: Enabling infrastructure

The overall score for pillar 2 is 1.2.

Table 10: Recommendations for Pillar 2, Enabling Infrastructure

Sub-area	Recommendation	Potential Actions
Education Enterprise Architecture and Data Governance	Implement a robust enterprise-architecture design considering education goals, technology, data and relevant use cases/applications.	Carry out analysis of the existing electronic data infrastructure in education, encompassing EMIS, education agencies, Open Education Resources, Learning Management Systems, HR management systems, National Statistics office of Georgia, and then develop a comprehensive strategy for data management and utilization.

		Develop an enterprise architecture for general education services. This should include data standards and mechanisms to connect fragmented systems to National Interoperability Service Bus. Create and deploy data dashboards tailored for both national and municipality level use, aimed at enhancing implementation and monitoring, streamlining decision-making processes, and simplifying documentation and reporting systems. Establish and legally mandate comprehensive data quality standards for educational data to ensure validity, reliability, interoperability, and currency, thereby upholding the highest standards in data management for education-related decisions. Enable educational datasets openly accessible, allowing for broad sharing, public analysis, and trust-building among all education stakeholders.
Connectivity	Extend high-quality internet connectivity to all schools, with a particular emphasis on ensuring access in rural and mountain schools, to reduce digital access divide and support remote learning opportunities where necessary *For schools that remain off the electrical-power grid, WiFi server-routers can support collection of education data for reporting and other information-management purposes. Some of these are open source, using the Moodle LMS, and provide access to the free resources (e.g., Khan Academy) that they have stored in a searchable repository.*	Enact and enforce legislation requiring ISPs and mobile network operators (MNOs) to provide connectivity to rural areas, ensuring students have access both in and out of school Map connectivity gaps and design tailored connectivity solutions for each school, particularly those in rural areas, including last mile connectivity. Procure and install WiFi-enabling server/routers for schools that remain unconnected. Server/routers such as Kolibri and RACHEL can be deployed at schools that remain "off the grid" to provide LMS-type services, access to DLRs and other key educational features.
Technology infrastructure	Ensure that all students have access to digital devices. *The approach to this recommendation must be selected by MES and/or GoG. Pathways to its execution are many, and include: the extension of the My First Computer program; providing grants or other forms of support for procurement, and; providing devices via state-run programs, and; Bring Your Own Device programs, among others. Every program poses*	Assess current situation, identifying needs for devices, digital skills training and pedagogical support. Develop and Implement Funding Strategies: Formulate comprehensive funding and management plans for purchasing, maintaining, and upgrading digital equipment, aligned with the Vision Statement in the Leadership and Governance pillar.

	challenges; all programs have well-established histories of implementation. Questions about cost, speed of deployment, prioritization, support, service-life and other areas are at issue. Ensure all teachers have access to their own device.	Distribute suitable devices to teachers at no cost. Consider developing a one-laptop-per teacher scheme. The same scheme could be extended to all professional administration staff who also seem to lack devices. Provide training in digital skills and pedagogy, and roll out the hardware provision, followed by monitoring and evaluation to measure user satisfaction, learning outcomes, and other relevant metrics. Develop and implement mechanisms to assist schools with technology infrastructure problems pertaining to hardware, software and applications, connectivity, and security. Each school should have access to technical support for technology troubleshooting. Develop a centrally managed intranet to have a shared network for communication, data exchange, collaboration, service provision, and analytics for management. Increase use of existing networks for collaboration, data exchange, service provision and management. Enact or adopt regulations ensuring that digital devices and educational resources comply with international standards for accessibility. Develop and adopt standards and guidelines for digital access. *Among the best of such standards is outlined in the Framework for Stakeholder Inclusion of the Pennsylvania State University.* Broaden the adoption of tailored guidelines for digital devices and applications, focusing specifically on meeting the educational needs of children with disabilities and those from marginalized groups.
Standards and interoperability across applications, devices, and equipment	Increase requirements for the interoperability of both data and applications.	Raise awareness and gain trust on the value added of standards and interoperability for core education service delivery through increased dissemination of the challenges in service provision, decision-making, and monitoring as well as qualitative and quantitative benefits such as efficiency and time-saving estimates. Adopt harmonized standards for internet connectivity, IT equipment, cybersecurity, LMS compatibility, etc., fostering predictable operational costs and enhanced interoperability. This approach facilitates decentralized implementation and routine decision-making, ensuring clarity in security protocols and interoperability while offering flexibility in procuring products/services.

		Implement a system where data is compatible across all relevant applications, featuring dashboard-based analytics and visual representation, and ensure that these applications are operational on all relevant platforms.

Pillar 3: Digitally Enabled Education Service Delivery and Analytics

Respondents assigned this pillar the lowest score (0.9) of the five.

Table 11: Recommendations for Digitally Enabled Education Service Delivery and Analytics

Sub-area	Recommendation	Potential Actions
Learners	Ensure that learners, particularly those disadvantaged, gain foundational skills and 21st-century skills.	Develop a strategy and a costed action plan to identify and support students who do not have computers and a broadband or 5G internet connection at home, such as provision of study place in institutions after class. Mobilize local libraries, community centers, youth clubs, and other venues. Conduct an in-depth assessment on the acquisition and application of foundational, digital and data skills as well as social emotional skills by students in line with the EU digital competency framework for citizens 2.2. Adopt national standards for digital competency levels among students, educators and citizens, such as the EU's Digital Competency framework, to align digital skilling efforts and facilitate data collection and measurement, addressing key data gaps in Georgia. Develop a clear vision and guideline on the minimum digital environment for learners, at home and at school, with recommended specifications and cost estimates, complementing the provision of paper based books with DLRs
Teachers	Upgrade in-service and preservice TPD programs to equip educators with digital skills, data literacy, and digital pedagogy, ensuring these competencies are both taught and assessed. Focus TPD on empowering teachers to effectively utilize digital tools and services in fostering students' foundational and 21st-century skills.	Strengthen digital pedagogy skills competency frameworks through allocation of resources, implementation plan, certificates, and link to incentives, and include as part of hiring strategy of new teachers and as part of promotions. Assess teachers' proficiency in digital skills, data literacy, and digital pedagogy, and develop Digital Learning Resources (DLRs) and training materials for enhancement. TPD support must be responsive to teachers' needs and must ensure that all new software tools are addressed. Incorporate professional trainers, classroom observation tools, and coaching into digitally enabled TPD programs, tailoring these resources to varying levels of teacher competence. Launch programs to encourage skilled young teachers to provide remote instruction in key subjects, such as Informatics and digital skills, to students in rural and remote areas. Secure funding for Teacher Professional Development (TPD) and Communities of Practice (online and face-to-face, design

		and deliver TPD courses, and conduct Monitoring and Evaluation (M&E) focused on the effectiveness of these programs.
Education administrators	Ensure that digital skills, data literacy and digital pedagogy are learned by administrators and measured. Ensure this initiative is supported by leadership-driven organizational and cultural changes at all levels	Develop and implement a comprehensive digital skills training program for education administrators, incorporating regular assessments to gauge proficiency. Enhance the availability and reliability of computer equipment and EMIS database resources for administrative purposes. Encourage and facilitate an organizational and cultural shift towards digitalization at all levels of educational leadership, not just among school-level service delivery staff
Digital Learning Resources	Finalize standards for DLRs to enhance quality and assess their impact on learning outcomes to identify the most educationally suitable resources. Research the effectiveness and cost-efficiency of Open Educational Resources (OERs) versus commercial Digital Learning Resources (DLRs).	*Examples of suites on OERs include such as, for example, the National Repository of Curriculum [NROC] at California State University, Monterey Bay.* Evaluate and Enhance DLR Quality: Implement a system to regularly assess the quality and effectiveness of existing DLRs. Finalize and Implement DLR Standards focusing on quality, inclusivity, local language accessibility, and bandwidth requirements. Create strategies to guarantee that students from marginalized communities can access and use DLRs. Clarify and communicate the process for integrating DLRs with the curriculum to ensure all educators are aware and can effectively utilize these resources.
Curriculum and pedagogy	Strengthen the curriculum and pedagogical practices for digitally enabled learning.	Leverage the current revision of the general education curriculum to integrate practical 21st-century and digital skills, such as purpose-driven informatics and transversal skills, essential more effectively for modern living and working environments. Develop or acquire digital tools focused on foundational skills and create a comprehensive repository of curriculum-aligned formative assessments for Assessment for Learning (AfL). Upgrade TPD programs to integrate digital usage, focusing on foundational skills and AfL tools, and introduce a requirement for certification in digital skills, data literacy, and digital pedagogy for all teachers.
School management and analytics	Ensure that school leadership has the access, capacities and appropriate incentives to share EMIS information with MES,	Ensure the continued support for development, adoption and effective implementation of the digital education action plans at the school level.

	with family and with community stakeholders.	Develop digital monitoring tools for school management and analytics at the level of school managers and administrators, leveraging data, feedback loops and interoperability to enable continuous improvements. Develop an incentivized program for advanced ICT expertise and capacity development at the national, regional, and local levels to be able to act as 'translators' that can lead and implement policy and strategy enabled by technology solutions but rooted firmly in equitable and high-quality learning for all. Modify incentives to ensure the precision of provided information, and conduct monitoring and evaluation (M&E) to identify barriers faced by school leadership in relation to EMIS data. Address interface and transmission issues in EMIS, provide resources for better information sharing, develop Teacher Professional Development (TPD) courses for updated EMIS tools, and conduct M&E to assess satisfaction levels among school leaders, families, and community members.

Pillar 4: Human Capacity

The score awarded by respondents to this pillar is 1.8.

Table 12: Recommendations for Pillar 4, Human Capacity

Sub-area	Recommendation	Potential Actions
Digital skills Data literacy and Culture	Develop programs to build digital skills and data literacy among key education system personnel, guided by targeted assessments of their current digital competencies and focusing on the skills required for effective information search, discovery and evaluation.	*Prioritized action, below, should be repeated for each key role — students, teachers, administrators, MES personnel.* Adopt a capability-based approach to delineate responsibilities between ministries and agencies under MoER and non-MoER including for budget and resources to capitalize on the unique strengths of these institutions, with a clear focus on advancing digital skills outcomes. Conduct School Sampling for Primary Data Collection: implement a comprehensive program to conduct representative school-level visits and data collection across various contexts, including urban and rural areas as well as well-resourced and underserved schools. This initiative will provide more detailed insights into the digital education landscape, enabling tailored interventions and policies to address specific challenges at the grassroots level. Develop tailored programs for building digital skills and data literacy for key education personnel, focusing on the specific needs identified through the assessments. Ensure these programs emphasize skills for data cleaning, analysis, effective information search, decision-making, discovery, and evaluation. Roll out these training programs and regularly monitor their effectiveness and impact on the participants' competencies.

		Comparative Analysis Against Benchmarks: Undertake an in-depth analysis to compare Georgia's digital education readiness against relevant country benchmarks and global examples of best practices. This comparative study will offer valuable perspectives on areas of strength and weakness, informing targeted strategies for improvement and aligning Georgia's digital education initiatives with global standards and proven methodologies.
Culture	Develop and implement a communications program to foster innovation and acceptance of failure/learning, backed by legislation and policies incentivizing creative efforts.	Recognize and strengthen existing talent through targeted capacity development as well as importing relevant talent from other public institutions and departments on secondments or through external hires Support user-centered design based on accurate (high-quality) data and use-cases. Implement and assess on-demand training for current tools and technologies and enhance support for data-driven decision-making processes.

Pillar 5: EdTech Market and Business Models

Given that the primary focus of this pillar is the backend-enabled collection, analysis and use of data regarding project management in terms of usage and other factors, we provide an overall recommendation for the structure, responsibilities and capacities within MES. The overall score earned by this pillar is 0.9.

Table 13: Recommendations for Pilllar 5, EdTech Market and Business Models

Sub-area	Recommendation	Potential Actions
Overall	Build capacity in all relevant entities within MES for development, implementation, measurement and TPD.	The EMIS Center is limited in its ability to do its mandated job by the additional responsibilities and related resources that are allocated to it; responsibilities that are assigned to the EMIS Center can be neglected due to the Center's over-commitment; other entities within MES fail to build EdTech capacities, reinforcing this cycle. It is essential that MES build EdTech capacity "across the board."
Management of EdTech Products and Services	Implement product-management software that helps gather real-time data insights on deployed Edtech products and services for understanding usage, relevance and impact	Data could address usage, operating costs, relevance and effectiveness, so as to support management and decision-making about fielded tools and services. Develop (or purchase off-the-shelf) and implement procurement software. Procurement support via software should include collection of needs, analysis of needs, and interoperable scoring. Develop a process for creating, reviewing, and sharing EdTech-related reporting for national and regional purposes that would analyze the effectiveness, cost, functionality. Establish an inventory management of the EdTech tools and services along with the costs, utilization, effectiveness, and relevance.

		Develop a clear mechanism for piloting new EdTech products, verifying the compliance for students' data privacy and accessibility before procurements.
Support for innovative business models	Improving access to financing and capital markets as well as customers are key for supporting an EdTech sector that can contribute to many aspects of education digitalization in the long term.	Develop and implement a communications strategy and training to support legalized online revenue streams. Legal online income must be seen by all as a legitimate means of revenue; private-sector and for-profit support for education must be seen as desirable.
Public Private Partnerships	Develop incentive mechanisms for raising private sector interest in developing digital education goods, consultancy, and services via access to capital, customers, and mutually beneficial public and private sector partnerships.	Develop and launch regular training/orientation workshops to help firms identify and apply for appropriate funding and partnership models. The private sector requires guidance that "out-competes" other possibilities for their participation. (If it is difficult for the private sector to qualify or apply for funding opportunities, they will not do so.) The potential for partnership should be streamlined, and guidance should be provided regularly. Conduct a mapping of private sector providers and promote their involvement in developing localized digital learning solutions and digital skills development. Encourage leveraging their expertise and resources to enhance access to untapped populations, particularly in rural areas, aligning with common learning objectives set by national standards for digital skills. This could include services such as financial inclusion initiatives provided by banks.

Annex 2: Methodology

Data collection involved literature review; stakeholder mapping; survey; validation interviews.

Literature review

The literature review involved more than 20 documents, reviewed in part as a stocktaking exercise to understand the state of Georgia's efforts to achieve digital transformation, These documents provided information about policy, key stakeholders, implementation and its effectiveness, plus information enabling international comparisons, as well as information about challenges posed to digitalization and the factors underlying those challenges. The education system in Georgia is both dynamic and large (as are all education systems), making this DERA reliant on the data-collection and representation activities of many authors and organizations outside the World Bank. The literature review comprises an essential source of information for this assessment.The literature review fueled a stakeholder-mapping activity intended to identify key stakeholders and their relationships to the education system and each other.

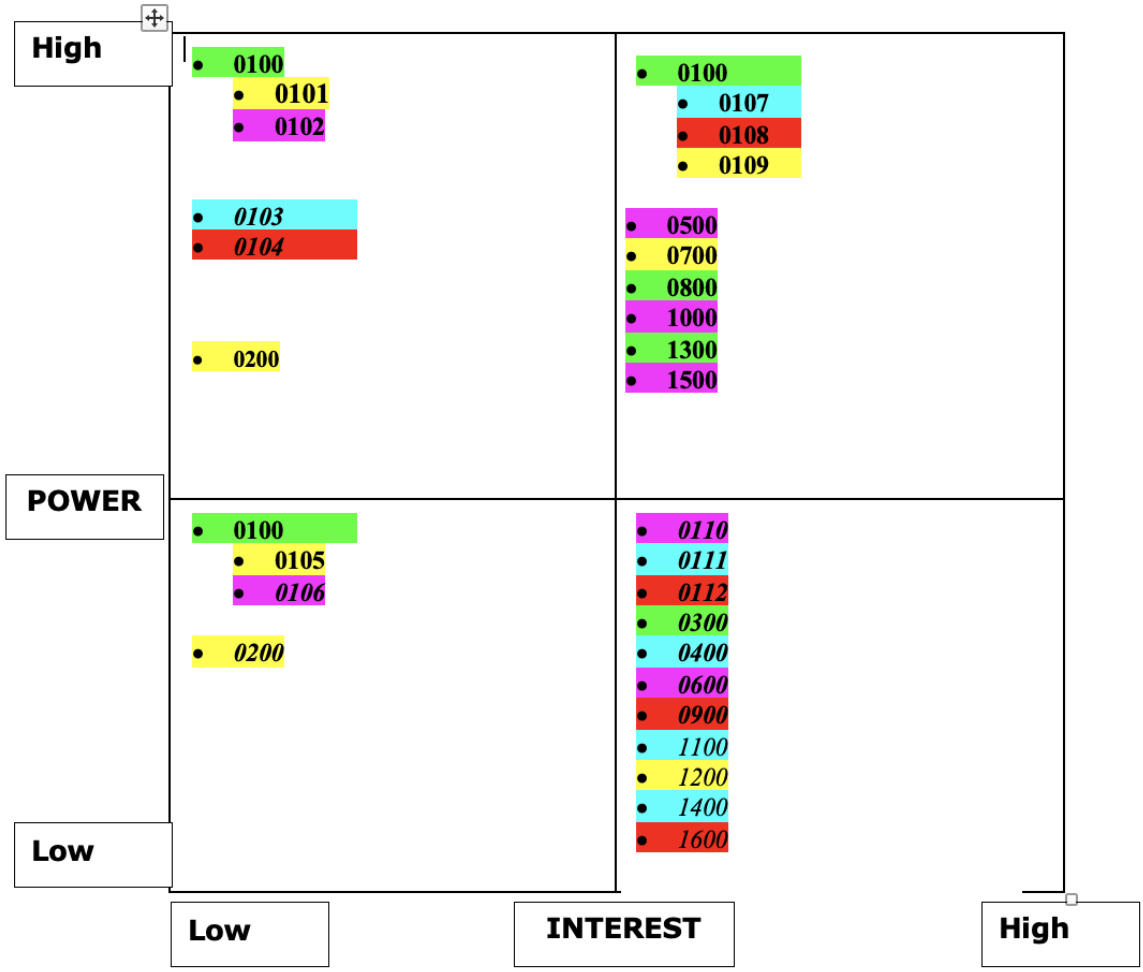
Stakeholder mapping

The primary purpose of the stakeholder map was to array key organizations in a typical stakeholder-map format, classified by interest and influence in relation to the digitalization of education. The report was developed by the GDERA team, which included one Georgian national who is familiar with the education system in Georgia and with organizations both within that system and with others that might be less directly impacted by digitalization.

In addition, the stakeholder mapping report categorized stakeholders as: private sector, public sector and public-private partnership (PPP). In light of both the characteristics of the questionnaire as well as Georgia's nascent technology-related private sector, more agencies were contacted, and more respondents

returned the questionnaire, from the public sector than from the private sector. Inasmuch as MES administers public education, and inasmuch as this report is intended to provide guidance to MES, the over-representation of the public sector is appropriate.

Figure 24: Stakeholder map



Key to the stakeholder map

Italics indicate that the entity is a Limited Entity under Public Law (LEPL) and therefore semi-independent of MES; indented items indicate entities that are within and wholly under the control of MES; items that are not indented or in italics represent entities, such as development partners, outside of GoG.

Table 14: Key to Stakeholder map

0100	Ministry of Education and Science of Georgia (MES)
0101	Administration Department at MES
0102	Department of Higher Education and Science Development (DHESD) at MES

0103	National Center for Education Quality and Evaluation (NCEQE) — responsible for education quality monitoring and management
0104	National Assessment and Examination Center (NAEC) — implements international and national assessments, including PISA, TIMSS, PIRLS, TALIS; NAEC has also piloted formative assessment tools, TAO FLIP+s and a school self-evaluation tool (within the TEEP program).
0105	Department of International Relations and Strategic Development at MES
0106	Financial Department at MES
0107	Project Management Unit: Innovation, Equity and Enhance the Quality Project (IIQP/I2Q) supported by the World Bank.
0108	Department of Vocational Education at MES
0109	Department of Preschool and General Education (DPGE)
0110	(National Center for) Education Management Information Systems (EMIS) — provides data for decision-making processes; collects, processes and disseminates education data; provides IT service to NAEC (e.g. hosts assessments and survey platforms such as TAO and Lime Survey).
0111	National Center for Teacher Professional Development (NCTPD)
0112	(National Center for) Educational and Scientific Infrastructure Development Agency (ESIDA)
0200	National Bank of Georgia
0300	Ltd Data Analysis Laboratory
0400	LLC United Global Technologies (UGT)
0500	Skills Agency - Georgia
0600	Digital Governance Agency (DGA)
0700	The Revenue Service of Georgia (RS)
0800	National Agency for Public Registry (NAPR)
0900	Ilia State University
1000	Ministry of Internally Displaced Persons from the Occupied Territories, Labor, Health and Social Affairs (MLHS)
1100	Information Technology Agency (ITA within MLHS)
1200	GOPA Worldwide Consultants - Technical Assistance to Skills Development for Matching Labour Market Needs in Georgia (an EU-funded project).
1300	Georgia's Innovation and Technology Agency
1400	EFA Georgia – Coalition of public organization working in the field of Education
1500	Internet Society — Georgia Chapter (ISOC — Georgia)
1600	Innovation Education Technologies – Georgia (IETG)

Table 1: Key to stakeholder map

Survey

The high-level-respondent survey solicits responses about each of the five pillars. Analyses and recommendations draw equally on the literature review, and refer when appropriate to the validation interviews, so as to develop a picture of the education system in Georgia that is evidence-based, accurate and specific from a long-distance viewpoint and in terms of detail.

Validation interviews

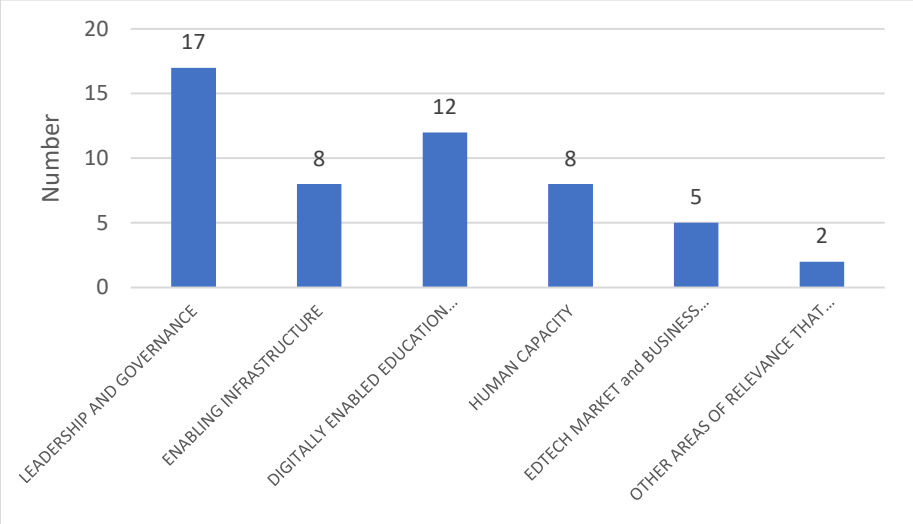
During the period, October 28 to November 4, 2022, the GDERA team conducted ten "validation interviews" with 16 respondents (six interviews were conducted with two respondents present) to both assure the accuracy of the survey data, when possible, and to gather first-hand information from education-system stakeholders. Interviews were in all cases conducted virtually. Of these 16 respondents, four had also returned responses to the survey; they were included as part of efforts to interview members of their organizations, and because their long-answer responses and the hyperlinks they provided to reports and other data sources suggested that they had detailed points of view that were not accommodated by the survey format. Select non-survey respondents were included because, while they did not return surveys,

they had experience working within or adjacent to the education system and were knowledgeable about MES and its efforts to digitalize education.

Survey-respondent profiles

Survey respondents comprise twenty-five purposefully identified persons with expertise in education in Georgia, the Georgian technology sector, or both of these. Respondents reported on their (self-assessed) areas of expertise:

Figure 25: Respondents' stated areas of expertise



As is clear, most survey respondents state that they are best qualified to discuss the Leadership and Governance pillar, which contains many of the sub-areas in which Georgia lags.

Sectoral representation

By design, survey respondents as a result of the distribution of invitations overwhelmingly (80 percent) represent the public sector. Survey-response invitations were distributed in total to 53 organizations, as shown in Table 2.

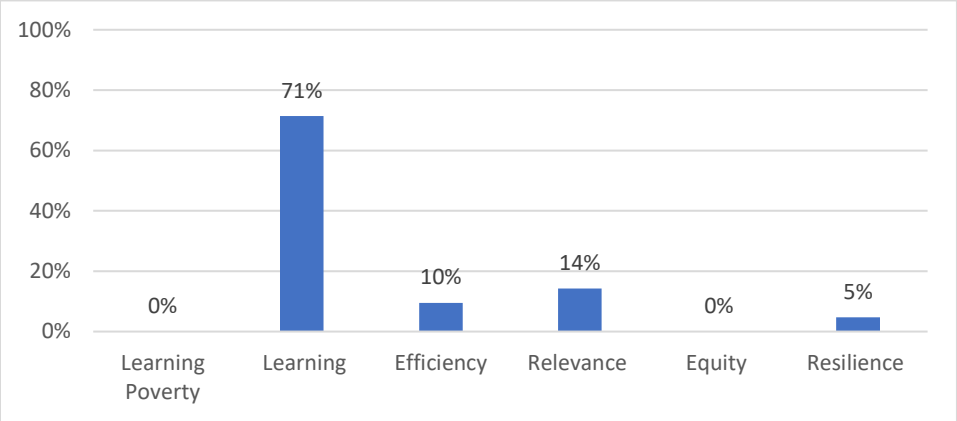
Table 2.

Organization type	**Number**
MES - Its departments and affiliated centers	11
Other GoG Agencies	10
Universities and Vocational Colleges	10
Technology Companies and Enabling Firms (Internet Service Providers [ISPs]	5
Non-Governmental Organizations (NGOs)	6
Donor Organizations (International)	11
Total	53

Of these, four private-sector respondents (16 percent) completed and returned surveys, with one respondent representing PPPs (Public-Private Partnerships – which, as discussed in relation to "Table 2 **Error! Reference source not found.**," are not very active in Georgia) and one respondent listing themselves as "other." (For more information about survey respondents and institution types, refer to the section "Actual vs total respondents.") Of the 25 respondents, 60 percent (15) reported that their organization was engaged

in activities in the education sector. Of these fifteen engaged in education, eleven reported that their organization was engaged exclusively at the national level. Per 71 percent of survey respondents (including the 15 respondents reporting that they were engaged with education), learning — as opposed to learning poverty, learning efficiency, the relevance of learning and other criteria — was identified the most important area in the education system, meaning that this is the area of highest concern.

Figure 26: Area of greatest concern in education system, per survey respondents

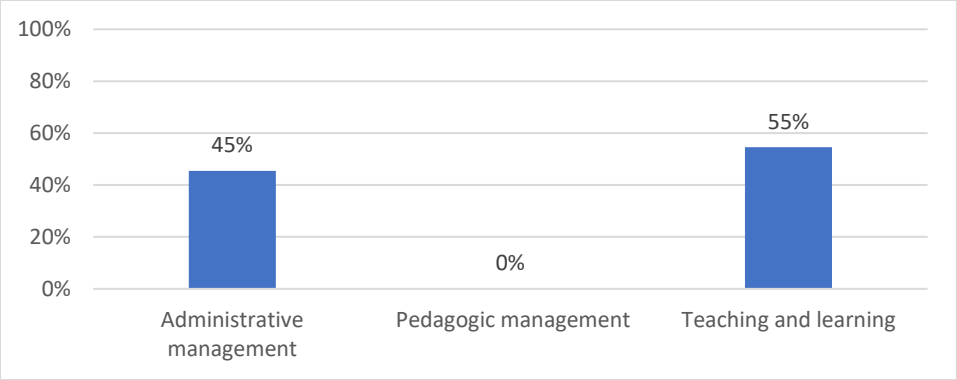


It is critical to note that many, if not all, of the above factors contribute to learning and to learning outcomes. As an example, increasing the relevance of education to the lives of students also improves students' learning outcomes (Angrist, et al., 2020). Nonetheless, respondents' level of agreement is very high, suggesting that rather than addressing effective and fair social policy (e.g., via equity), the education system faces challenges in relation to its primary obligation, that of ensuring all learners achieve acceptable levels of learning *per se*. (Addressing equity issues is both effective and *cost*-effective in terms of boosting scores on international assessments.)

Areas of challenge for digitally-enabled education

Survey respondents identified the areas that were most important for digital education were associated with administrative management and teaching and learning. In stark contrast to the teacher policies and challenges with professional development programs identified, pedagogic management as an area was not identified as an area of challenge. This may be construed as lack of shared understanding of this area as ripe for digitally enabled solutions.

Figure 27: Most important area for digital education, per survey respondents



This study collected primary data through the in-depth survey, which was based on a comprehensive Digital Education Readiness Assessment instrument with five identified pillars. The aims of the survey were to determine stakeholder perceptions and knowledge as well as to gather relevant information for analysis. Survey participants' personal information was protected in line with the World Bank Personal Data Protection Policy.[37] A data-licensing agreement was also prepared and signed with counterparts at MES.

This study primarily assesses the digital education readiness level in Georgia through five survey pillars with different numbers of relevant questions, including "Leadership and Governance" with 27 questions, "Enabling Infrastructure" with 30 questions, **"**Education Service Delivery and Analytics" with 30 questions, "Human Capacity" with 20 questions, and **"**EdTech Market and Business Models" with 19 questions. Each question is designed with four options detailing the state of that criterion at four assessment levels — latent, emerging, established, and advanced (See Annex D for a detailed explanation of the methodology). Meanwhile, "I do not know" was added as the fifth option to enable any respondents lacking relevant knowledge or specialized in unrelated areas to make a selection. For analysis, the four integers, or assessment-level options, were calculated as 1 to 4 accordingly. "I do not know" was scaled as 0, but was taken as a valid entry. (Any unfilled survey question was considered invalid.) There are 25 survey participants in this study. The actual number of survey respondents varies among pillars and sub-areas.
Based on the assigned score from 0 to 5, this study calculated the standardized mean score, assessing the digital education readiness level of each pillar and sub-area through the following standardization equation:
$x' = [x - \text{Min}(x)]/[\text{Max}(x) - \text{Min}(x)] * 4$
Where:

- x indicates the total average score of each pillar and sub-area.
- $\text{Min}(x)$ indicates the theoretical total minimum score (number of questions*0), hypothesizing that the "I do not know" option is selected for all the questions in each pillar and sub-area.
- $\text{Max}(x)$ indicates the theoretical total maximum score (number of questions*4), hypothesizing that the "advanced" option is selected for all the questions in each pillar and sub-area question.
- 4 indicates the four-point rubric.

Thus, the final calculated standardized score indicates the digital education readiness level as follows.

Assessment Level	Latent	Emerging	Established	Advanced
Standardized Score	(0-1)	(1-2)	(2-3)	(3-4)

[37] The personal data protection policy is available at: https://www.worldbank.org/en/programs/accountability/data-privacy .

The above-illustrated method shows the calculated response rate, total average score, minimum score, maximum score, and the standardized score of each pillar and sub-area in this study. In addition, the assessment score is further disaggregated by each participant's institution type, including public, private, and public-private partnership, and education-related and education-unrelated.
Administrative and learning assessment data analysis: In addition to the survey data, this study also reviewed quantitative and qualitative data from a wide range of data sources, including PISA 2018, ITU, UNESCO, the EMIS Center, as well as project documents. In combination with the additional documents and comments received from the survey, these data are also applied in this study to supplement the assessment of the digital education readiness level in Georgia as opposed to the survey data, which might be subjective.

Actual vs total respondents: It is critical to observe that for many questions, from 4 to 20 respondents select, "I don't know" – a response that is always available to them as a means of balancing the mandatory nature of all questions. As a result, including these responses as the dividend used to determine the mean score can influence the resulting standardized mean. (As an example, if 8 respondents selected option B, the mean would be 2.00; if, however, 17 respondents select "I don't know" are in the calculation, the mean would appear as 0.32.) (see Annex 4 for more information)

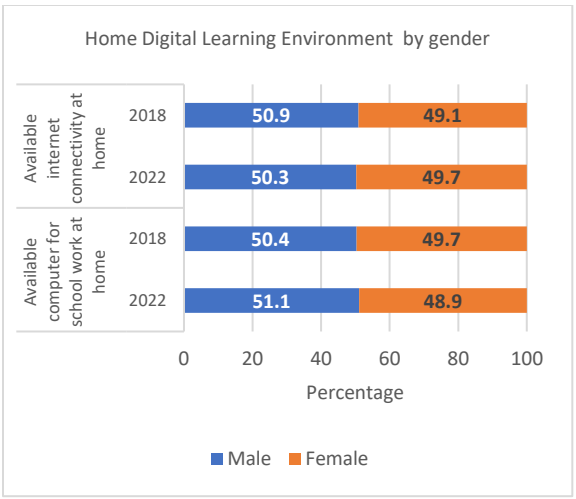
Throughout this report, mean calculations are based on the total number of respondents (25) to the survey, to enable comparison across and within pillars and sub-areas. In addition, this method highlights respondents' awareness of initiatives authorized by MES, contributing to our understanding of government effectiveness in terms of the knowledge of government activity as demonstrated by education stakeholders. In addition to enabling comparison among responses, this approach has three additional justifications:

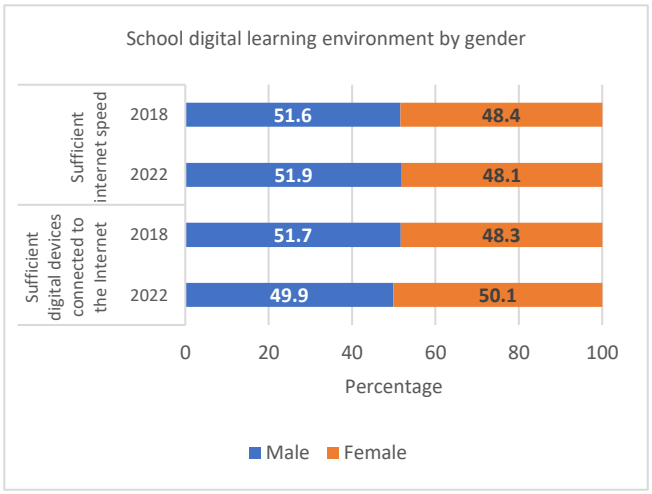
- As the participants are from diverse institutions, scores are calculated for MES/non-MES and, for questions related to the private sector and/or PPPs, for respondents' membership in those categories. (For more information, See Annex 3 Survey responses by institution type")
- All responses are validated via interviews with education stakeholders in Georgia, and;
- This report addresses the perceptions of education stakeholders. In many instances, laws, regulations and standards are adopted but are not implemented because stakeholders are unaware of them. (This is a serious problem in Georgia, for more information see the section, "**Error! Reference source not found.**.")

Annex 3: Access to digital learning environments at home and at school

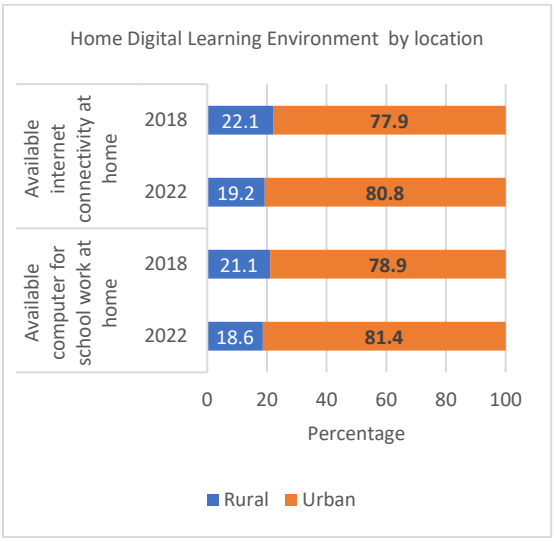
This study examines the digital learning environment at both home and school, focusing on internet connectivity and digital devices. Nearly no gender difference at home and school was found in either 2018 or 2022. However, there was a notable urban-rural disparity at home and school. Compared to 2018, the disparity was widened in the home digital learning environment but narrowed in the school digital learning environment in 2022. Among students lacking sufficient digital learning environments at home and school, the majority came from the bottom 40% of SES households, with around 45% in 2018 and 38% in 2022.

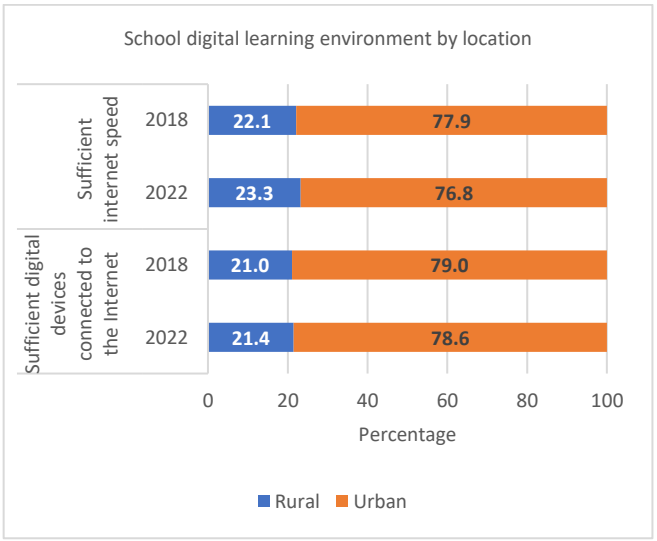
Figure 28. Home and School Digital Learning Environments by gender, location, SES



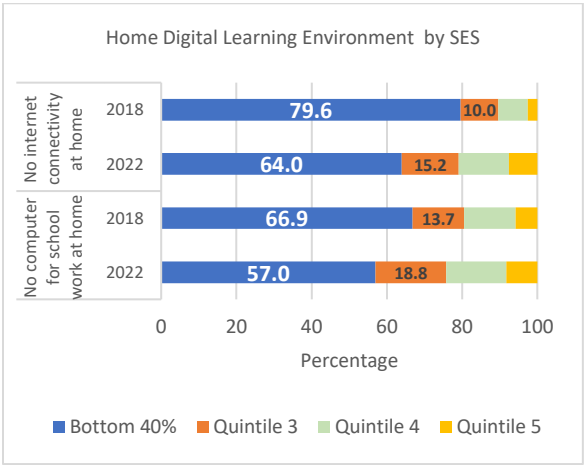


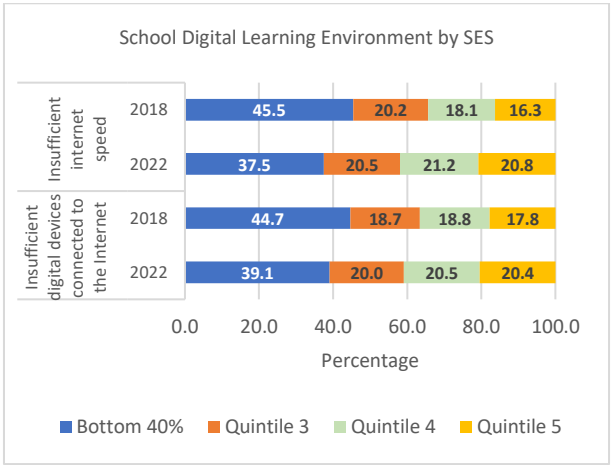
Source: OECD PISA 2022





Source: OECD PISA 2022

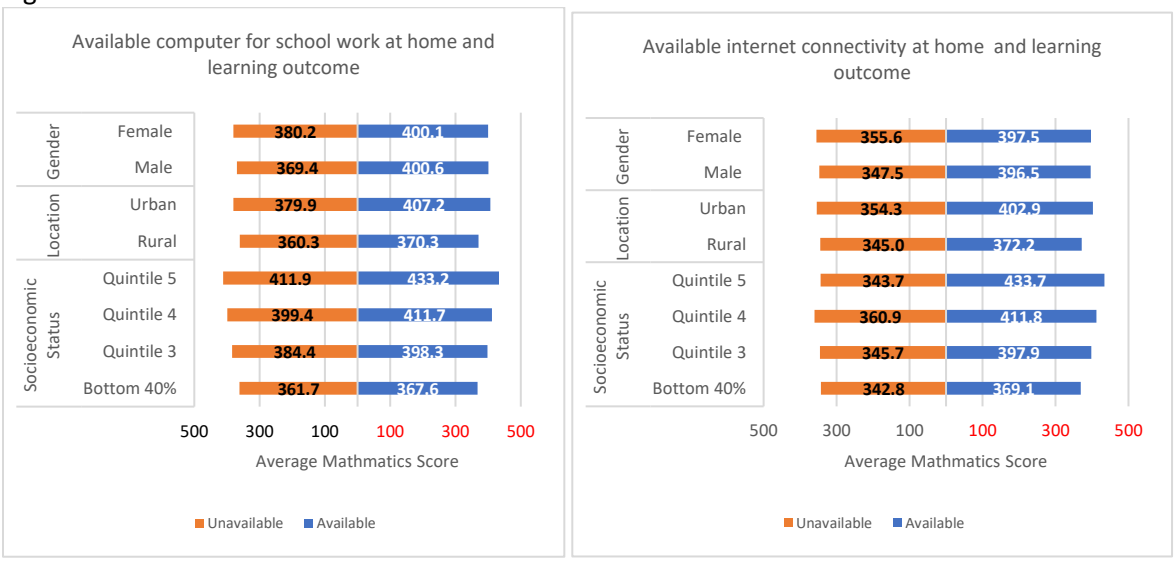




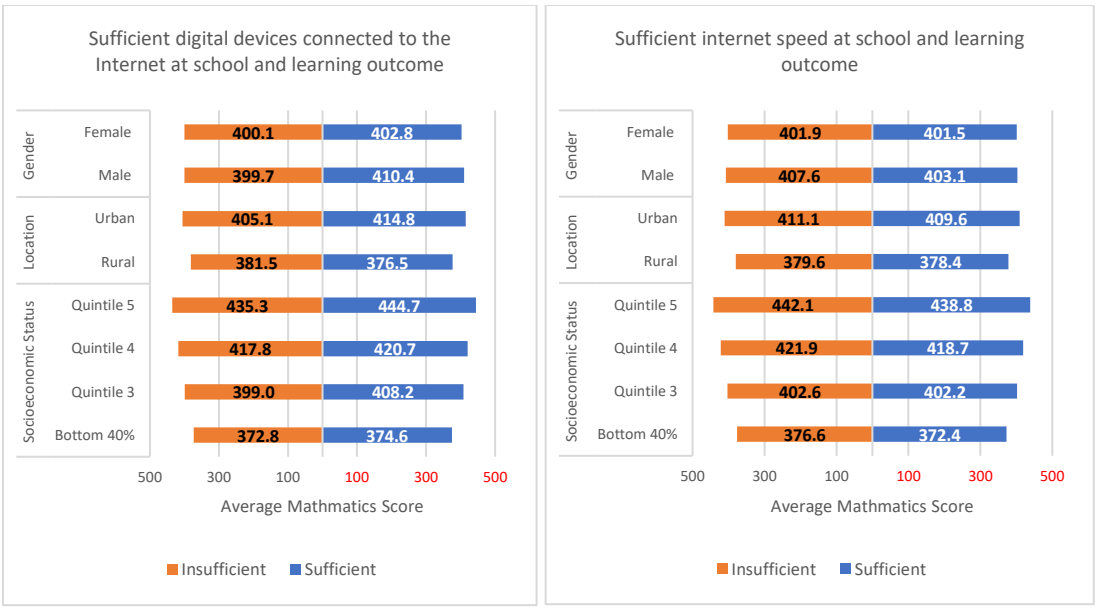
Source: OECD PISA 2022

The average PISA score in mathematics was consistently higher for students with access to a home digital learning environment compared to those without, regardless of gender, location, and household socioeconomic status (SES). Regarding to school digital learning environment, though students showed a higher mathematics score with sufficient digital devices connected to the internet, but a lower mathematics score with sufficient internet speed, regardless of gender, location, and household SES.

Figure 29:



Source: OECD PISA 2022

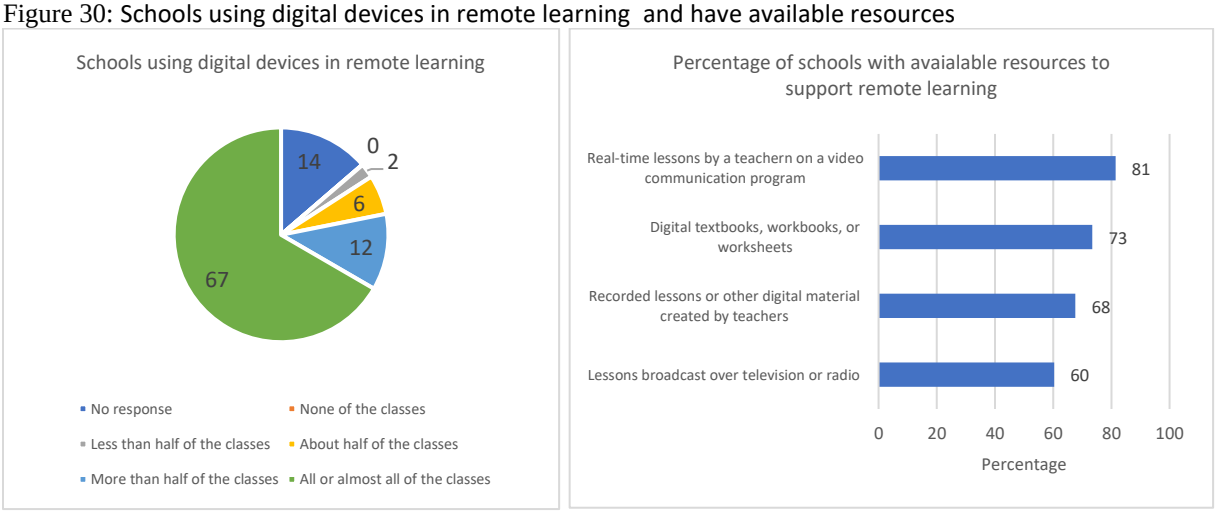


Source: OECD PISA 2022

Covid-19 Related Data

Amid the Covid-19 pandemic, digital devices played a significant role in facilitating remote learning. A substantial 67% of schools employed digital devices in virtually all classes, with a mere 2% not using them at all for remote learning. Various instructional methods were implemented, including real-time lessons conducted by teachers through video communication programs (81%), lessons utilizing recorded content or other digital materials created by teachers (68%), and lessons broadcasted via television or radio (60%). Additionally, digital textbooks, workbooks, or worksheets were adopted in 73% of schools.

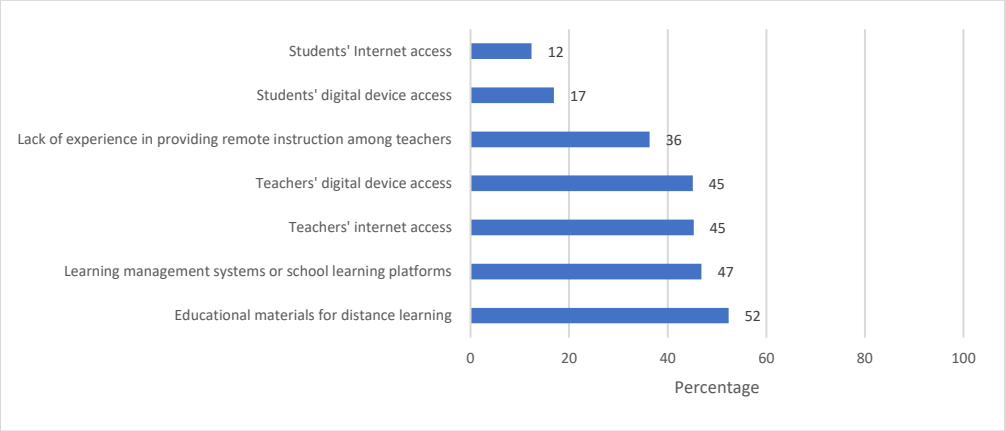
Figure 30: Schools using digital devices in remote learning and have available resources



Note: n= 6,583 (school-level data is merged with student-level data)
Source: OECD PISA 2022

When school buildings closed due to COVID-19, various challenges arose in delivering remote instruction. Fewer than 20% of schools reported having no issues with students' internet and digital device access. About 45% of schools did not face problems with teachers' internet and digital device access. The lack of experience among teachers in delivering remote instruction posed a hindrance for 64% of schools to varying degrees. Approximately 50% of schools encountered challenges related to the lack of learning management systems and educational materials for distance learning.

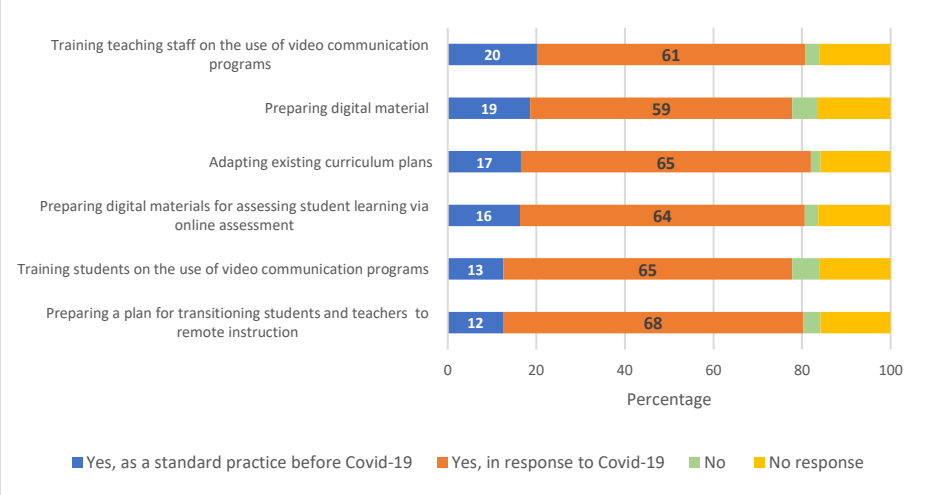
Figure 31: Percentage of schools with no issues in providing remote instruction



Note: n= 6,583 (school-level data is merged with student-level data)
Source: OECD PISA 2022

Prior to Covid-19, fewer than 20% of schools had already taken proactive measures in preparation for remote learning instruction. These measures included training teaching staff on the use of video communication programs (20%), preparing digital materials (19%), adapting existing curriculum plans (17%), preparing digital materials for assessing student learning via online assessment (16%), training students on the use of video communication programs (13%), and preparing a plan for transitioning students and teachers to remote instruction (12%). In response to Covid-19, approximately 60% of schools followed up on these actions.

Figure 32: Actions prepared for remote learning instruction



Note: n= 6,583 (school-level data is merged with student-level data)
Source: OECD PISA 2022

Annex 4: Survey responses by institution type

The following graphs show responses to survey questions about the five pillars, disaggregated by institution type by respondents' engagement with the education system or lack of same. (Left-hand graphs show institution types; right-hand graphs show educational involvement.)

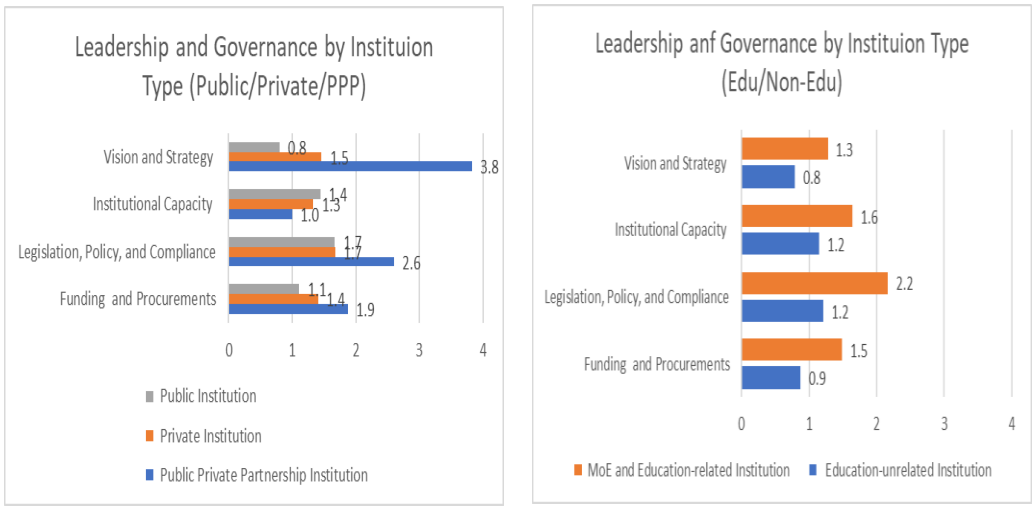


Figure 33: Pillar 1-Leadership & Governance by institution and education-system involvement

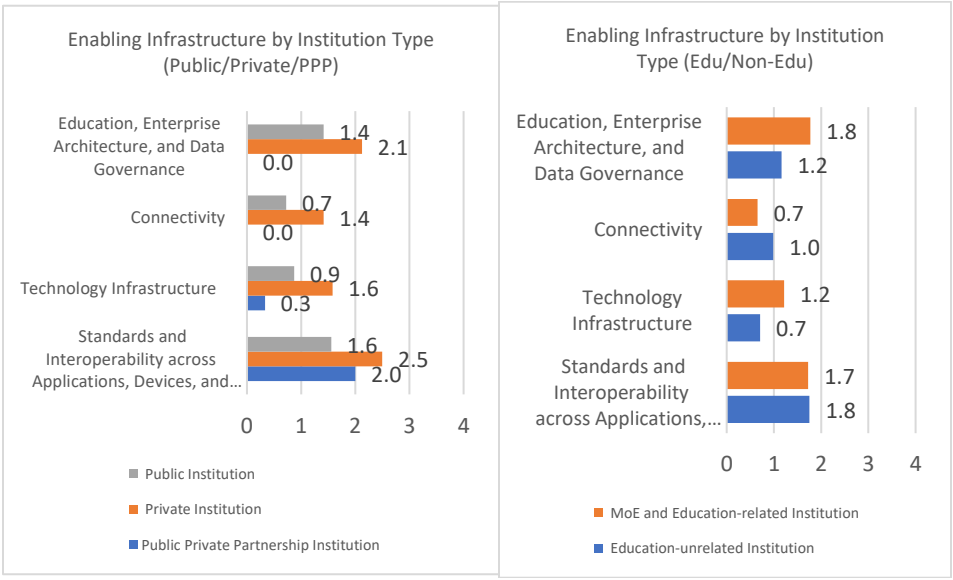


Figure 34: Pillar 2-Enabling Infrastructure by institution and education-system involvement

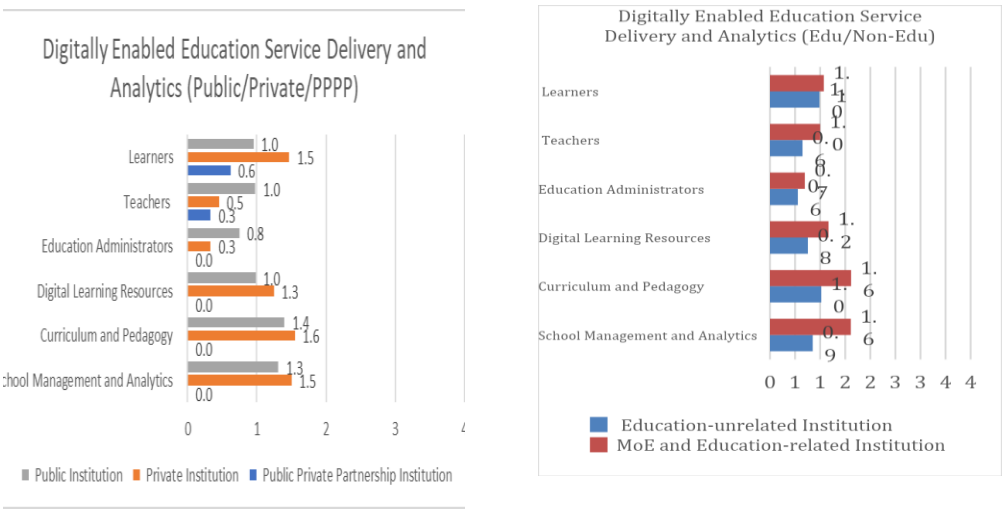


Figure 35: Pillar 3-Digitally enabled education service-delivery and analytics by institution and education-system involvement

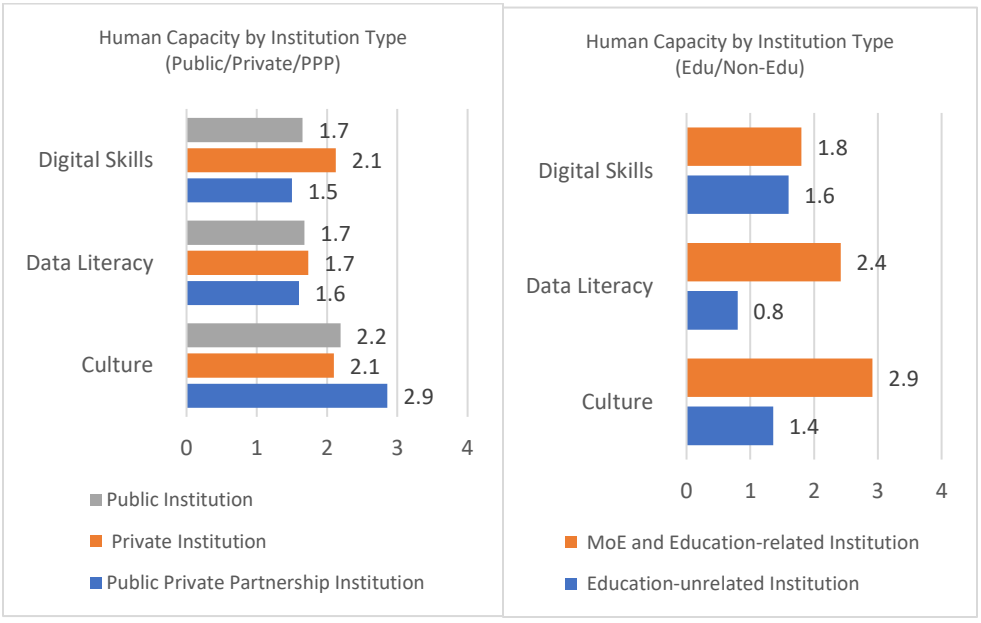


Figure 36: Pillar 4-Human Capacity by institution and education-system involvement

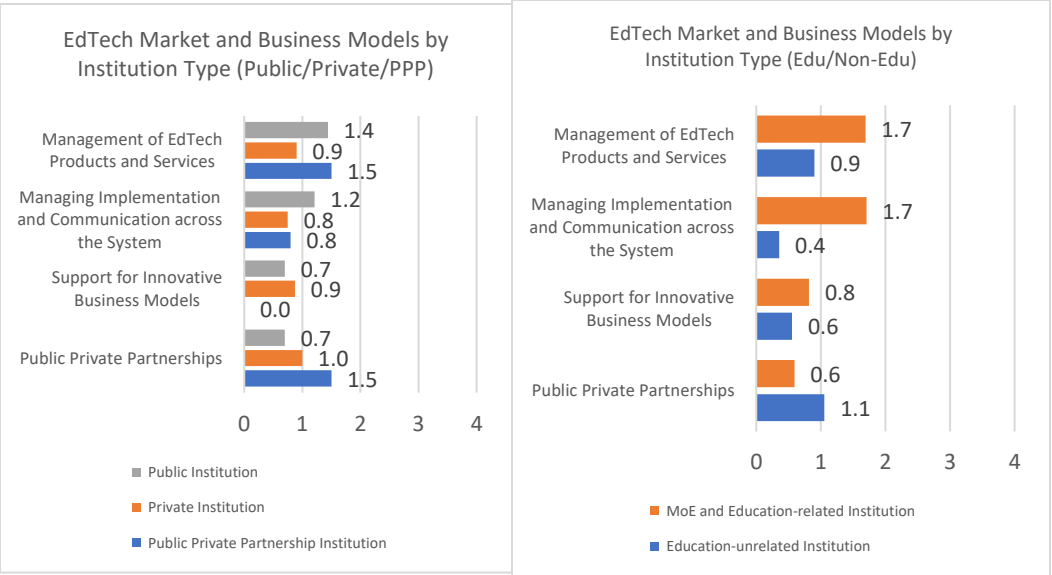


Figure 37: Pillar 5-EdTech Market and Business Models by institution and education-system involvement

Annex 5: Survey Responses

The following table shows complete survey responses in each of the five pillars and each pillar's sub-areas.

Table 16: Summary of survey responses

Survey Domain	# Total Respondents	# Actual Respondents	Response Rate	# Survey Questions	Mean Score	Min Score	Max Score	Standardized Mean Score
Leadership and Governance	**25**	**23**	**92%**	**27**	**37.13**	**0**	**108**	**1.4**
Vision and Strategy	25	16	64%	6	6.26	0	24	1.0
Institutional Capacity	25	20	80%	3	4.22	0	12	1.4
Legislation, Policy, and Compliance	25	22	88%	10	17.09	0	40	1.7
Funding and Procurements	25	17	68%	8	9.57	0	32	1.2
Enabling Infrastructure	**25**	**23**	**92%**	**30**	**35.74**	**0**	**120**	**1.2**
Education, Enterprise Architecture, and Data Governance	25	22	88%	8	11.61	0	32	1.5
Connectivity	25	11	44%	6	4.87	0	24	0.8
Technology Infrastructure	25	19	76%	9	8.74	0	36	1.0
Standards and Interoperability across Applications, Devices, and Equipment	25	21	84%	7	10.52	0	28	1.5
Digitally Enabled Education Service	**25**	**21**	**84%**	**30**	**28.22**	**0**	**120**	**0.9**

Delivery and Analytics								
Learners	25	19	76%	8	7.57	0	32	0.9
Teachers	25	13	52%	6	4.65	0	24	0.8
Education administrators	25	11	44%	3	1.74	0	12	0.6
Digital Learning Resources	25	21	84%	5	4.52	0	20	0.9
Curriculum and Pedagogy	25	14	56%	5	6.22	0	20	1.2
School Management and Analytics	25	14	56%	3	3.52	0	12	1.2
Human Capacity	**25**	**21**	**84%**	**20**	**35.91**	**0**	**80**	**1.8**
Digital Skills	25	22	88%	8	13.09	0	32	1.6
Data Literacy	25	16	64%	5	8.04	0	20	1.6
Culture	25	21	84%	7	14.78	0	28	2.1
EdTech Market and Business Models	**25**	**20**	**80%**	**19**	**17.04**	**0**	**76**	**0.9**
Management of EdTech Products and Services	25	19	76%	10	10.35	0	40	1.0
Managing Implementation and Communication across the System	25	13	52%	5	4.17	0	20	0.8
Support for Innovative Business Models	25	9	36%	2	1.13	0	8	0.6
Public Private Partnerships	25	10	40%	2	1.39	0	8	0.7

Table 2: Survey responses in detail

Annex 6: Glossary

Architecture refers to the overall design of a computing system and the logical and physical interrelationships between its components in reference to computers, software or networks. The architecture specifies the hardware, software, access methods and protocols used throughout the system.

Artificial Intelligence (AI) System refers to a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments.

Blended Learning refers to an approach that provides innovative educational solutions through an effective mix of traditional classroom teaching with online activities for teachers, trainers, and students.

Database refers to a large, organized collection of information that is accessed via software.

Data exchange refers to the process of sending and receiving data in such a manner that the information content or meaning assigned to the data is not altered during the transmission**.**

Data integrity refers to the consistency of data on the same variables collected from different sources.

Data specialists refer to experts in statistics and computer science who know the tricks for finding the signals hidden in the noise of big data.
Digital procurement (E-procurement) refers to the integration of digital technologies in the replacement or redesign of paper-based procedures throughout the procurement process.

Data protection refers to the set of privacy-motivated laws, policies, and procedures that aim to minimize intrusion into respondents' privacy caused by the collection, storage, and dissemination of personal data.

Data quality refers to adequacy, accuracy, relevance, and explanatory capacity of data to inform decisions.

Digital security refers to the economic and social aspects of cybersecurity, as opposed to purely technical aspects and those related to criminal law enforcement or national and international security.

Digitalization refers to the wider process of using digital technologies for transformational impact.

Digital maturity refers to an organization's ability to respond and adapt to disruptive technological trends.

Digital transformation refers to a process of adoption of digital tools and methods by an organization, typically those that have either not been including the digital factor as part of their core activities or have not kept up with the pace of change in digital technologies.

Digital divide refers to the gap between individuals, households, businesses, and geographic areas at different socio-economic levels with regard to both their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities.

Digital learning resources (DLR) refers to digitally formatted, educational materials like; graphics, images or photos, audio and video, simulations, and animations that are used to support students in achieving their learning outcomes.

Digital literacy refers to the ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies for employment, decent jobs, and entrepreneurship. It includes competencies that are variously referred to as computer literacy, ICT literacy, information literacy, and media literacy.

Digital pedagogy refers to pedagogy supporting the development of digital skills and targeted and methodically meaningful use of digital solutions, learning resources, and content in teaching and learning.

Digital skills refer to skills to use digital devices, communication applications and networks to access, manage and exploit information. They enable individuals to produce and share digital content, communicate and collaborate, and solve problems for effective and creative self-fulfillment in life, learning, work, and wider social activities.

(Basic) Digital skills refer to skills to use hardware (e.g., using a keyboard and operating touch-screen technology), software (e.g., word processing, managing files on laptops, managing privacy settings on mobile phones), and basic online operations (e.g., email, search, or completing an online form).

(Intermediate) Digital skills refer to basic digital skills as well as media creation, problem-solving, computational thinking and coding, fundamentals of data analysis, AI, and robotics. It may also include digital entrepreneurship skills, including starting and running an online business and using digital tools to run any business. Related cognitive domain skills focus on analysis, evaluation, and creation. Relevant for secondary school and HEIs.

(Advanced) Digital skills refer to skills needed by specialists in ICT professions such as computer programming and network management, including for advancing the digitalization of education systems. These include applications of advanced computational thinking, cutting-edge technologies like (AI) and big data, coding, cybersecurity, Internet of Things (IoT), mobile app development, and related transversal skills.

Education technology (EdTech) refers to the combination of ICT products and services aimed at facilitating and enhancing learning.

E-governance refers to the use of emerging information and communication technologies (ICT) to facilitate the processes of government and public administration. It is about providing citizens with the ability to choose the manner in which they wish to interact with their governments and the choices governments make about how ICT will be deployed to support citizen choices.

Enterprise Architecture refers to a coherent, integrated 'blueprint' to optimize the often fragmented legacy of processes (both manual and automated) into an integrated environment that supports service delivery, while being responsive to changes. It provides a common vocabulary to discuss implementation across entities.

Fixed broadband internet refers to high-speed connectivity for public use of at least 256 Kbit/s or more in one or both directions (downloading and uploading).

Fiber optics is a high-bandwidth transmission technology that uses light to carry digital information.

Formative assessment refers to an assessment for learning, information gathered in the assessment process to identify learning needs and adjust teaching.

Government digital transformation refers to the ongoing application of modern technology to deliver government services and programs more efficiently, transparently, and cost-effectively.

Gross Enrollment Rate (GER) refers to total enrolment in a specific level of education, regardless of age, expressed as a percentage of the eligible official school-age population corresponding to the same level of education in a given school year.

Integration refers to the process of linking independently designed applications to work together as one system so that the data contained in each becomes part of a larger, more comprehensive system that quickly and easily shares data when needed. Integration also enables access to data and functionality from such independent applications through a single interface or service.

Interoperability refers to the ability of organizations to interact towards mutually beneficial goals, involving the sharing of information and knowledge between organizations by means of the exchange of data with other systems using common standards. Interoperability also includes the ability of systems to provide and receive services from other systems and to use the services so interchanged to enable them to operate effectively together.

Pre-service teacher training refers to recognized and organized private and public educational programs designed to train future teachers to formally enter the profession at a specified level of education. Graduates receive a government-recognized teaching qualification. Pre-service training does not cover teachers who do not meet officially recognized training standards and are enrolled in a teacher training course to earn accreditation concurrent to their work as a teacher.

Project-Based Learning (PBL) is a teaching method in which students learn by actively engaging in real-world and personally meaningful projects.

Standards and Interoperability across Applications, Devices, and Equipment refers to the development and use of data standards that enable consistent and accurate collection and exchange of information across systems. This further includes mechanisms for information exchange across applications, devices, and equipment that support health, education, and social protection service delivery in the country.

Summative assessment refers to an assessment of learning and summary assessments of student performance — including tests and examinations and end-of-year marks. Summative assessments of individual students may be used for promotion, certification, or admission to higher levels of education.

Technology architecture refers to the logical software and hardware capabilities that are required to support the deployment of business, data, and application services. This includes IT infrastructure, middleware, networks, communications, processing, standards, etc.

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