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EdTech Readiness in Zambia's TVET Institutions:

Assessing Institutional Capacity for Technology Integration - Final Report

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WORLD BANK GROUP

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Acronyms

EdTech	Education Technology
ETRI	Education and Technology Readiness Index
GIZ	German Society for International Cooperation
ICT	Information and Communications Technologies
ILO	International Labor Organization
MoE	Ministry of Education
MoTS	Ministry of Technology and Science
MYSA	Ministry of Youth, Sports and Arts
NOS	National Occupational Standards
SDF	Skills Development Fund
TEVETA	Technical Education, Vocational, and Entrepreneurship Training Authority
TEVET	Technical Education, Vocational, and Entrepreneurship Training
TVET	Technical and Vocational Education and Training
UNDP	United Nations Development Program
ZAMREN	Zambia Research and Education Network
ZICTA	Zambia Information and Communications Technology Authority

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Executive Summary

As digital technologies become increasingly embedded in daily life and reshape certain segments of the labor market, employers are placing greater emphasis on skills that are both broader and more closely aligned with evolving industry needs. In response, Technical and Vocational Education and Training (TVET) [1]—referred to in Zambia as Technical, Entrepreneurial, Vocational Education and Training (TEVET)—institutions are under growing pressure to integrate Information and Communication Technologies (ICT) into the design and delivery of training and student services. Such integration is critical not only to enrich learning experiences but also to prepare learners for success in a rapidly changing labor market. While aligning training systems with labor market needs is widely recognized as a policy priority, limited evidence exists on how the supply side is adapting in practice. Even scarcer is comprehensive information on the extent to which TVET institutions are incorporating new technologies, modern equipment, or updated teaching practices to reshape the skills they provide in line with shifting workplace demands.

In response, the Zambia Team, in collaboration with the EdTech Team from the Education Global Practice, adapted the Education and Technology Readiness Index (ETRI)—originally developed for basic education—to assess ICT-related policies and practices in the TVET sector. This effort led to the development of ETRI-TVET, a tailored tool designed to reflect specific priorities, dynamics, and good practices of TVET systems, drawing on established literature and empirical evidence. The tool was also adapted to align with Zambia's national context and was piloted in the country for the first time.

This initial version of ETRI-TVET prioritizes three conceptual pillars that are critical for effective ICT integration in TVET institutions: devices, connectivity, and instructors. The **first pillar** focuses on the availability of and access to computing devices, which is an essential condition to integrate ICT into teaching and learning. While offline devices can support learning, internet-connected devices enable access to a wide range of digital resources–assessed under the **second pillar**. Finally, the **third pillar** assesses whether instructors are equipped and willing to use digital technologies in training delivery, ensuring that connected devices are used purposefully and with appropriate pedagogical guidance.

ETRI-TVET used two instruments to assess current policies and practices: a **Policy Questionnaire**, which captured the perspectives of 34 TVET policymakers, including representatives from government ministries, regulatory and legislative bodies, professional associations, and other key stakeholders on the strategies, policies, and initiatives undertaken by the government to promote ICT integration in training delivery; and an **Institutional Survey**, which collected data on

[1] The terms TVET and TEVET are used interchangeably throughout this report, except where local terminology is more appropriate.

infrastructure and practices from a nationally representative sample of 227 TVET institutions across the country. The information was then analyzed and categorized under one of three levels using a scoring methodology. The lowest level, "**Needs Improvement**", is assigned to policies, infrastructure conditions, or practices that prevent the initiation of ICT integration. The "**Emerging**" or medium level reflects situations where initial steps toward ICT integration are possible but not yet supported by processes that ensure consistent, uninterrupted use for teaching and learning. The highest level, **"Good"** is given to policies, practices, or infrastructure conditions that enable comprehensive ICT integration—where resources are both available and usable, and systems are in place to secure sustained access over time. These instruments were administered between October and November 2024.

This report presents the results of this comprehensive effort to generate much-needed evidence on the policies and practices shaping the use of education technology in Zambia's TVET sector. In a context where data on how the supply side is responding remains limited, the findings offer a critical foundation for understanding current readiness and identifying priority areas for action. The data and insights summarized here can serve as a baseline to guide future investments and policy decisions aimed at strengthening EdTech integration across Zambia's training system.

Policy Environment: Summary of Findings

The ETRI-TVET assessment reveals very interesting aspects about the EdTech ecosystem of TVET institutions in Zambia. While a few initiatives exist to provide subsidies or directly distribute devices, current policies aimed at expanding access to, and effective use of computing devices remain limited in both scope and enforcement. Most training institutions receive minimal government support to acquire digital devices or establish partnerships with private companies to finance such investments. Although standards exist requiring institutions to have digital devices, they often do not address usability, actual usage, or pedagogical relevance. These standards tend to be basic and general, and their enforcement is likely constrained by limited resources for inspections and the absence of a clear mandate to monitor the functionality and maintenance of devices in public institutions.

Measures to support usability, such as providing technical assistance to address challenges in using and maintaining devices, are currently lacking. While government policy documents acknowledge the importance of supporting learners with disabilities, there is limited evidence of concrete measures being implemented at the institutional level to ensure appropriate accommodations. Overall, the ETRI-TVET framework rates the pillar on device-related policies as "Needs improvement," highlighting a valuable opportunity to strengthen ongoing efforts through targeted action, better enforcement, and expanded institutional support.

The Government has taken important steps to expand internet access in public TVET institutions, particularly in rural and underserved areas, through a combination of strategic partnerships and infrastructure investments. These efforts have also included initiatives to make internet services more affordable for institutions. However, formal connectivity standards have not yet been established to ensure equitable access across all public and private training institutions, and there are currently no mechanisms in place to monitor internet availability and reliability. As a result, the ETRI-TVET framework rates the pillar on connectivity policies as "Needs improvement," pointing to a valuable opportunity to build on the Government's current momentum and extend access more systematically across the entire sector.

Current efforts to define, assess, and strengthen the digital skills of TVET instructors remain limited in scope and reach. While the Government of Zambia has recently developed a digital competencies framework for teachers, its implementation within the TVET sector is not yet clearly established and appears to be limited, as most instructor training curricula continue to focus primarily on basic digital skills. The absence of a system to assess instructors' digital competencies, along with limited information on participation and outcomes in existing training programs, creates a gap in understanding both current capabilities and areas for improvement. Although the Government appears to support opportunities for instructors to build digital skills, the lack of mechanisms to help instructors prioritize or fully engage in these opportunities may reduce their impact on the effective integration of digital technologies in teaching and learning. As such, the ETRI-TVET framework rates the pillar on instructor digital skills as "Needs improvement," indicating a strong opportunity to deepen and scale ongoing efforts in this area.

Practices in Institutions: Summary of Findings

Among the 227 TVET institutions that participated in this study, a notable finding—given its role as a key enabler of EdTech integration—is that more than half report unreliable access to electricity. Although most institutions are connected to the national grid, electricity supply is often inconsistent, prompting many to rely on backup systems such as generators or solar panels. Even with these alternatives, power availability remains limited in many cases, particularly in provinces such as Northern and Muchinga, where challenges are more pronounced. Access to reliable electricity is a foundational requirement for the effective use of digital devices in teaching and learning. As such, limited power supply continues to pose a significant barrier to the consistent and meaningful integration of technology in technical training. Strengthening electricity access across institutions remains a critical step toward advancing digital readiness and unlocking the full potential of EdTech in Zambia's TVET sector.

The majority of TVET institutions in Zambia report having access to computing devices, marking important progress toward digital integration. However, their use for pedagogical purposes

remains limited. At least one-third of training institutions do not have any devices available for instructors or learners, and many of those that do, face high individual-to-device ratios. In most cases, devices are used in designated computing rooms with controlled access, reflecting a practical approach in low-resource settings to ensure equipment security and organized use. Even in programs where device use is most integrated, students in 40 percent of institutions receive fewer than 8 hours of computer time per week—and in 17 percent of institutions, students report no access at all.

While 65 percent of institutions report allocating part of their budget to procure devices, current levels of investment appear insufficient to support regular and effective integration of digital tools into teaching and learning. As a result, the ETRI-TVET framework classifies institutional infrastructure and practices related to computing devices at the "Emerging" level—highlighting a strong opportunity to improve access and promote more consistent use of technology in instruction.

Internet connectivity is reported available in nearly 90 percent of TVET institutions in Zambia—a significant achievement that reflects ongoing efforts to strengthen the digital infrastructure of the sector. Most institutions use broadband connections that are generally reliable and offer adequate speed, and in about two-thirds of cases, service is uninterrupted thanks to consistent payment of monthly fees.

However, despite this important progress, the use of the Internet for pedagogical purposes remains limited. While administrative devices have internet access in nearly 80 percent of institutions, fewer than half of the devices used by instructors and learners are connected. Combined with limited access to devices for teaching and learning, this restricts the broader use of digital resources in the classroom. As a result, institutional infrastructure and connectivity practices are classified as "Emerging" under the ETRI-TVET framework, highlighting an opportunity to build on the existing foundation and expand access to support more effective integration of EdTech into teaching and learning.

Support for instructors to integrate digital technologies into teaching remains constrained, presenting a key area for growth. A high proportion of instructors are estimated not to have received digital skills training during their pre-service education, underscoring the importance of in-service opportunities—both to build their capacity to teach using digital tools and to equip learners with basic digital skills.

Nonetheless, current professional development offerings in this area are scarce and may not yet be sufficient to foster the depth of knowledge and confidence needed to support meaningful shifts in pedagogical practice. In the absence of robust training opportunities, providing structured support to encourage digital exploration and self-paced learning becomes even more critical. However, such support is largely unavailable in most institutions. As a result, the ETRI-TVET framework places the Instructors Pillar at the lower end of the "Emerging" level, highlighting

a clear opportunity to scale up capacity-building efforts and better enable instructors to harness the potential of digital technologies in the classroom.

Summary of Recommendations

Integrating digital technologies into education is essential for modernizing training delivery and enhancing learning experiences. Achieving this requires coordinated strategies that address access, infrastructure, standards, connectivity, institutional support, and instructor development. The findings from this assessment offer a critical baseline for the Government of Zambia to guide future investments, strengthen institutional capacity, and inform policy actions that advance the digital transformation of the TVET system. Based on these results, this report presents a set of actionable recommendations (detailed in **Section V** and summarized here) to support the development of a roadmap for effective and sustainable EdTech integration.

Reliable Electricity as a Prerequisite

- Access to consistent and reliable electricity is foundational for EdTech integration in TVET institutions. To support digital learning environments, continued efforts are needed to expand grid infrastructure, promote renewable energy solutions like solar systems, and implement energy-efficient practices to ensure uninterrupted power supply.

Leveraging Digital Development Partnerships

- Strategic partnerships—with government agencies, donors, private sector actors, and civil society—can help mobilize resources, improve coordination, and align digital investments with education priorities. These partnerships can expand connectivity, provide digital tools, support instructor training, and enhance data systems for EdTech monitoring.

Devices and Connectivity: Strengthening the Digital Foundation

- Collaborate with private companies to finance, supply, and maintain digital devices for institutions, ensuring long-term sustainability. Explore partnerships with national telecoms and providers like Starlink to extend internet access and offer zero-rated data packages for learners and instructors.
- Incorporate minimum digital access requirements into institutional registration standards to ensure equitable access to devices and internet. Work with organizations such as ZAMREN to negotiate lower bandwidth costs and expand access to private institutions.
- Ensure each institution has on-site technical personnel to maintain and support digital infrastructure.

Empowering Instructors Through Training and Support

- Device and Training Package: Regular access to devices, combined with training, is essential for instructors to practice, apply, and sustain digital skills.
- Digital competency frameworks are an important first step, but they need to be translated into practical, subject-specific training modules with clear examples of skill progression to support real classroom application.
- A sustained approach to developing teachers' digital skills could be strengthened through competency-based assessments, helping to identify gaps, reinforce training needs, and guide resources more effectively.
- Continuous professional development is important to keep teachers current with new technologies and emerging pedagogical approaches, ensuring digital skills are meaningfully integrated into classroom practice.

I. Introduction

Rapid technological advancements are reshaping labor markets across the globe, including in Africa, leading to shifts in the types of skills demanded by employers. These changes are not only influencing the nature of jobs but are also redefining the competencies required to perform them effectively. In this context, education and training systems, including technical and vocational education and training (TVET), must evolve to remain relevant. Aligning more closely with labor market needs is critical to ensure that learners are adequately prepared to enter the workforce and remain competitive over time. While this alignment is increasingly recognized as a policy priority, there is limited information on how supply-side systems are actually responding. Even more scarce is evidence that provides a comprehensive view of how TVET institutions are integrating technology, modern equipment, or updated instructional practices to reshape the skills they impart in line with evolving workplace demands.

In this context, the Education Technology (EdTech) Team, within the Education Global Practice, provides strategic support to countries on leveraging technology to support teaching and learning. As part of this work, the EdTech Team developed the Education and Technology Readiness Index (ETRI), an instrument designed to help countries assess their policies and practices related to education technologies in primary and secondary schools. The ETRI estimates the overall readiness of school systems to effectively deploy EdTech, helping to identify areas for improvement and monitor progress over time.

In close collaboration with the Zambia Education Team, the ETRI initiative has been expanded to cover TVET institutions. These institutions are increasingly called upon to integrate ICT in the design and delivery of training and student services to better equip learners with digital skills and enhance their learning experience. The adaptation of ETRI for TVET—referred to as ETRI-TVET—was informed by global literature, good practices, and Zambia's specific policy priorities and institutional context, where the instruments were first implemented. ETRI-TVET seeks to achieve four objectives:

1. ***Assess*** the extent to which digital technologies are integrated into the delivery of training in TVET institutions.
2. ***Analyze*** practices around three essential areas —devices, connectivity, and instructors— to determine institutional readiness for effective ICT integration.
3. ***Inform*** policy and institutional interventions to expand and improve the use of digital technologies in TVET.
4. ***Strengthen evidence*** for decision making by establishing a reliable baseline of current practices and challenges related to digital technology use in the TVET sector.

The **Institutional Survey** was administered in Zambia between October and November 2024 to a nationally representative sample of 227 TVET institutions. In parallel, the **Policy Questionnaire** was conducted with 34 TVET policymakers, including representatives from government ministries, regulatory and legislative bodies, professional associations, and other key stakeholders.

This report presents the results of a comprehensive effort to generate and provide evidence on the policies and practices related to education technology in Zambia's TVET sector. The data and findings summarized here can serve as a baseline to inform future investments in EdTech in Zambia. The report is organized as follows. After the introduction, **Section II** presents the methodology, detailing the conceptual pillars and topics covered by the survey instruments, the data collection process, and the analytical approach. This section also provides a brief description of the sample. **Section III** presents the EdTech policy results, summarizing the findings from the Policy Questionnaire administered to key stakeholders and organized around three conceptual pillars: devices, internet connectivity, and instructors. **Section IV** presents the EdTech practice results based on the Institutional Survey, structured around the same pillars. Finally, **Section V** offers recommendations for policymakers and TVET system administrators based on the findings.

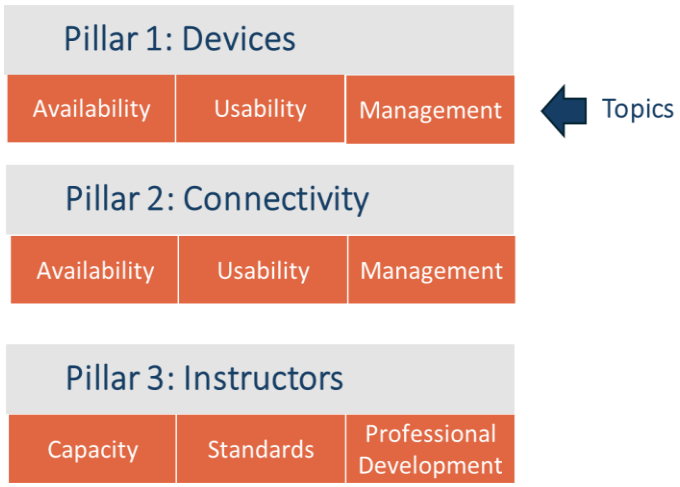
II. Methodology

Thematic Pillars and Topics

ETRI-TVET Zambia prioritizes three conceptual pillars that are critical for effective ICT integration in TVET institutions: devices, connectivity, and instructors. These pillars were selected based on their foundational role in enabling digital teaching and learning within the Zambian context. The first pillar focuses on the availability of computing devices, which are a basic requirement for integrating ICT into teaching and learning. While offline devices can contribute to better learning outcomes, their effectiveness is greatly enhanced by access to the internet, which is assessed under the second pillar. Yet, having connected devices is not enough; their use must be supported by instructors who are willing and able to integrate digital technologies into training delivery. The third pillar therefore examines instructor readiness and capacity to effectively use ICT in the classroom.

Each pillar is subdivided into three topics that explore TVET institutions' infrastructure and practices. As shown in Figure 1, the topics under the first two pillars address three main questions: (i) Are devices and connectivity available at the institution? (ii) Are they of sufficient quality and quantity to be used by learners, instructors, and administrative staff? (iii) Are they managed in a way that ensures uninterrupted access in both the short and long run? The third pillar explores a distinct set of questions: (i) Are instructors currently able to incorporate ICT into teaching? (ii) How is their expected ability determined and measured? (iii) What kind of support do instructors receive to facilitate the expected integration of digital technologies into their daily work?

Figure 1 – ETRI-TVET Zambia: Thematic Pillars and Topics Covered



Data for ETRI-TVET was collected via phone interviews with institutional leaders, in-person visits, and interviews with policymakers and system administrators. The primary method is phone interviews with TVET institution leaders (principals, directors, deans, presidents, or CEOs), using a standardized 30-question Institutional Survey aligned with the thematic pillars. A second method consists of in-person visits to a subset of institutions, combining quantitative and qualitative data through an observation guide to corroborate and enrich phone responses. The third method is the 31-question Policy Questionnaire, which collects data on relevant policies, regulations, and interventions through interviews with policymakers, TVET system administrators, and other government technical experts, recognizing the enabling role of policy in ICT integration.

Sample Description

The ETRI-TVET Institutional Survey was administered to a nationally representative sample of 227 institutions. The sampling frame comprised 427 training institutions registered under the Ministry of Technology and Science's Technical Education, Vocational, and Entrepreneurship Training Authority (TEVETA), as listed in the 2024 Public Notice on Registered Training Institutions. Phone interviews were conducted between October and November 2024. To ensure responses reflected a comprehensive understanding of institutional ICT infrastructure and practices, the survey targeted the most senior staff available. About 58 percent of respondents were top managers (principals, directors, CEOs, deans), 24 percent were middle managers (heads of departments, training managers, head teachers), and 18 percent were first-line staff (instructors, coordinators, lecturers, and officers).

The sampled TVET institutions are diverse in type, predominantly offer entry-level qualifications, and most hold Grade 3 status—the minimum threshold required to provide training services. The sample comprises private (45 percent), public (32 percent), faith-based (15 percent), and non-governmental (6 percent) providers. Most institutions offer entry-level qualifications: 77 percent provide Level 3 certificates or below, including Skills Awards and Trade Test certificates[2]. An additional 8 percent offer Level 4 certificates, 1 percent provide Level 5 certificates, and 14 percent offer Diploma-level programs.[3]

[2] TEVETA authorizes TVET institutions to provide training leading to seven qualification levels that differ on programs' duration and minimum entry requirements. They are: 1. Trade Test Certificate Level III (3 months, open entry), 2. Trade Test Certificate Level II (6 months, Grade 9 Certificate), 3. Skills Award (less than 480 hours), 4. Level 3 Certificate (1 year, 1 pass), Level 4 Certificate (2 years, 5 passes), Level 5 Certificate (2.5 years, 5 O' Levels), and Diploma (3 years, 5 O' Levels). Source: Technical Education, Vocational, and Entrepreneurship Training Authority (TEVETA), 2024 Prospectus.

[3] Higher-level programs are concentrated in larger institutions, primarily located in Lusaka and Copperbelt provinces. Private providers are more likely to offer Skills Awards, while public institutions have a larger share offering Diplomas and Level 4 and 5 certificates.

Approximately 60 percent of sampled institutions hold a Grade 3 status[4]. About 33 percent are classified as Grade 2, indicating "Good" institutions with critical areas for improvement. Only 7 percent of institutions achieve a Grade 1 status, reserved for "Very Good" institutions with only minor weaknesses to address (see Figures A1 and A2 in Annex A).

Training providers are primarily urban-based and varied in type[5]. Nearly half (46 percent) are located in Lusaka and 23 percent in Copperbelt, with the remaining 31 percent spread across seven provinces. The majority of institutions are training centers (25 percent), training institutes (20 percent), and colleges (15 percent), followed by driving schools (7 percent), youth resource centers (7 percent), academies (2 percent), universities (1 percent), and training schools (1 percent) (See Figure A3 in Annex A).

The Policy Questionnaire was administered to policy and technical experts with knowledge of the policies, public investments, and regulations that influence TVET institutions' use and capacity to integrate digital technologies into their training programs. A total of 34 TVET policymakers, implementers, and experts participated between October 11, 2024, and January 8, 2025, in Lusaka. Participants included representatives from government ministries, TVET institutions, regulatory and legislative bodies, international donors, professional associations, church organizations, and independent experts (See Annex B for the list of interviewed institutions). Additionally, in-person visits were conducted in 22 randomly selected institutions, representing 10 percent of the sample.

Data Analysis

ETRI-TVET applies a scoring methodology to assess the readiness of government policies and institutional practices to support ICT integration in training delivery. Each response to the Institutional Survey and Policy Questionnaire is scored from 0 to 4, based on alignment with practices identified by global experts as essential for effective ICT integration in TVET. Question scores are averaged to create Topic scores, which are then averaged to produce Pillar scores, using simple (unweighted) averages in all cases. As illustrated in Figure 2, the scores classify policies, infrastructure and practices into three levels:

- **Needs Improvement (lowest level)**: Refer to policies, infrastructure or practices that currently do not allow for meaningful ICT integration in TVET institutions. This may include the absence

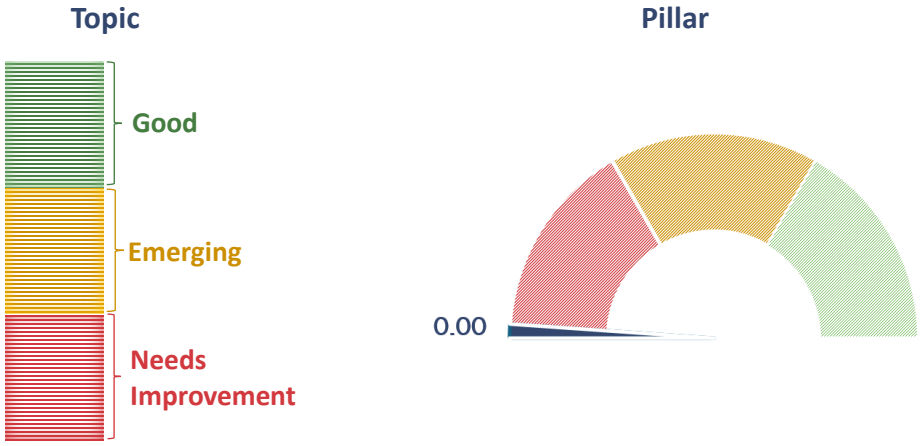
[4] TEVETA grades TVET institutions between one and three, considering eight elements: staff and instructors' qualifications, infrastructure, learner-instructor ratio, availability of equipment, tools and materials, curricula, assessments, and availability of documents for management systems (TEVETA's Public Notice of Registered Training Institutions as of January 1st, 2024).

[5] The typology of about a quarter of institutions, mostly private, was not clearly specified.

of a national ICT in education policy, a lack of computing devices, or institutions without internet connectivity.

- **Emerging (intermediate level)**: Describes conditions where ICT integration is underway but not yet fully established. Devices or connectivity may be available but remain limited in quality, scale, or coordination. Institutional efforts are often ad hoc or uneven, with key processes—such as maintenance, training, or curriculum integration—not yet formalized. As a result, the use of ICT for teaching and learning is possible but not yet seamless, sustained, or systematically supported.
- **Good (Highest level):** Assigned to policies, infrastructure conditions, or practices that enable comprehensive ICT integration. Resources are available, usable, and monitored to ensure sustained or improved access to connected digital devices over the medium and long term.

Figure 2 – Visualization of ETRI-TVET Topic and Pillar Scoring



While this study provides valuable insights, it is not without limitations. Data collection depended on an updated contact list of all TVET institutions to reach their leaders, and in some cases, institutions had to be replaced when they could not be reached despite efforts to obtain the most recent phone numbers. The study also relies on self-reported data from leaders. Although they could invite other staff to participate in the interview and enumerators applied measures to cross-validate responses (e.g., on-site validation for a subsample, cross-checks across questions), some questions may not have fully captured the intended dimensions, and some responses may have been affected by recall or social desirability bias.

III. EdTech Policy Landscape: Key Findings

In any EdTech ecosystem, government regulations and standards are critical for promoting, enabling, and ensuring the effective integration of ICT in education and training. In Zambia, three key policy documents provide a strategic framework to guide the integration of digital technologies across the economy, with a strong emphasis on digital skills development. The first and most comprehensive is the Eight National Development Plan (8NDP), which sets national priorities for 2022-2026 period and places digital skills development at the center of efforts to achieve an industrialized and diversified economy. The second is the 2023 National ICT Policy, which establishes an overarching direction to harness ICT for transforming key economic sectors, structured around four themes, the first of which is enhancing digital skills. The third is the 2023 National Digital Transformation Strategy, a framework designed to guide the digitalization of public and private institutions, with digital literacy and skills as one of its main pillars.

Despite this strategic focus, the contribution of these national policy documents to digital skills development has been constrained by challenges in implementation and the lack of clear accountability mechanisms. The **2023 National ICT Policy** outlines measures such as promoting ICT skills in educational institutions, improving training programs, and supporting the development of local ICT content and solutions. However, as of 2025, implementation is not systematically monitored, and experts suggest that progress has been slow, largely due to budget constraints. Similarly, the **National Digital Transformation Strategy** proposes measures such as enhancing data on digital skills, building institutional capacity, ensuring inclusive digital learning programs, and fostering the development of ICT professionals with intermediate and advanced skills. Yet, according to the implementation plan, there is no publicly available information on the status or outcomes of these initiatives as of May 2025.

In addition to national strategies, there are also sector-specific policies guiding the integration of digital technologies in TVET—most notably the 2020 National Technical Education, Vocational and Entrepreneurship Training Policy and the 2024-2028 Open Distance and Flexible Learning (ODFL) Strategy. The 2020 TEVET Policy aims to mainstream ICT by enhancing connectivity in institutions, improving staff digital competences, and equipping learners with emerging skills such as artificial intelligence to foster innovation and research. The 2024-2028 ODFL strategy provides a framework for remote TVET delivery, emphasizing investments in ICT infrastructure and instructor capacity. However, as with broader national policies, the extent of implementation and impact on digital technology use in TVET institutions remains unclear.

Multiple stakeholders share responsibility for integrating digital technologies into TVET. The Ministry of Technology and Science (MoTS) sets the overall vision for digitalizing the sector and

coordinates efforts to equip institutions with ICT laboratories, as outlined in the ***National Digital Transformation Strategy*** and the **2020 TEVET Policy**[6]. MoTS also leads the implementation of the **Open Distance and Flexible Learning Strategy** and oversees key components of the *National Digital Transformation Strategy*, including expanding broadband access in training institutions, and identifying national digital competency needs. The Technical, Vocational and Entrepreneurship Authority (TEVETA) plays a central role in operationalizing digital skills policies by defining learner competencies, developing curricula, setting infrastructure standards, and aligning training with labor market needs. A detailed list of TEVETA's functions is provided in Annex C.

Pillar 1 - Devices

ETRI-TVET collected data on the policy and ecosystem conditions in Zambia that facilitate access to digital devices in TVET institutions, focusing on three areas. First, it examined the availability of programs that support device acquisition by institutions. Second, it assessed the existence and enforcement of device access standards to ensure that computing devices are available in both public and private institutions, even without external support. Third, it reviewed measures to ensure device usability, including technical support, accommodation for learners with disabilities, and requirements for using digital tools for administrative tasks.

Topic 1: Enabling Access

Support for TVET institutions in acquiring digital devices remains limited. Only a few initiatives provide subsidies or direct distribution of devices. One is the **Skills Development Fund (SDF)**, which channels funds from a tax levy on employers to support infrastructure investments in public and private institutions, including purchasing digital devices. However, experts note that the fund is insufficient to meet the digital technology needs of all institutions. Another initiative is the **Connecting Learning Institutions Program**, implemented since 2011 by the Zambia Information and Communications Technology Authority (ZICTA), with support from MoTS. This program donates devices but benefits only public training institutions in rural and underserved areas. A third source of support comes from international organizations. For example, the **UNDP's Digitalisation Programme** donated devices to Youth Resource Centers under the Ministry of Youth, Sports and Arts (MYSA); the German Development Cooperation (GIZ)'s training professionals for Zambia's water and energy (THRIVE) project that distributed devices and rehabilitated labs for water and energy training programs; and the **European Union (EU)**'s and International Labor Organization (ILO)'s Skills Development for Increased Employability (SDEP)

[6] The TVET policy was prepared by the then Ministry of Higher Education in 2020. However, responsibility for its implementation now rests with the Ministry of Technology and Science (MoTS).

Program provided devices and servers for training programs in mining, agriculture, tourism and energy.

Opportunities to leverage private sector investment in the procurement of digital devices for TVET institutions remain largely untapped. When public financial resources to invest in digital devices are constrained, governments can either seek partnerships with companies to subsidize or distribute devices or empower training providers to do so. In Zambia, no formal programs or agreements of this kind are currently evident. Customs and excise duty exemptions on imported digital equipment may serve as one potential mechanism to encourage private sector involvement, although they were not specifically designed for this purpose and their effectiveness in supporting TVET remains unclear.

Topic 2: Standards

While Zambia has standards requiring TVET institutions to provide access to digital devices, enforcement and ongoing monitoring remain limited. TEVETA's registration process mandates that all institutions have a computer laboratory with sufficient furniture and a device-to-student ratio of 1:1 or 1:2. However, it is unclear whether compliance is reviewed beyond initial registration, for instance during license renewals, accreditation, or new program approvals.

Inspections by TEVETA are intended to monitor device availability but are reported to be irregular due to limited financial resources and an insufficient number of inspectors, especially given the more than 400 institutions dispersed across the country. Critical practices to monitor the proper functioning and maintenance of digital devices in public institutions are not in place. No designated agency is responsible for overseeing this process, and there is neither a central monitoring system nor a protocol to regularly assess digital fitness in public training institutions to ensure devices can keep up with technological change. Although TEVETA has directed institutions to develop internal ICT policies for device acquisition, maintenance, and disposal, most have yet to finalize them.

Topic 3: Usability

Technical support for maintaining digital devices in public institutions is limited, affecting both their usability and continued functioning. Although public district ICT officers could offer such support, they are not present in every district and cannot serve all institutions. As a result, institutions often face a trade-off between diverting limited resources to repair equipment or leaving malfunctioning devices unused.

Although policies require training institutions to ensure digital devices are accessible to learners with disabilities, enforcement appears limited and focused primarily on physical access. The 2012 *National Disability Policy* assigns responsibility to MoTS and TEVETA to ensure

learners with disabilities have access to training at all levels, implying that accommodation should be made for them. The *National ICT Policy Implementation Plan* (2022-2026) highlights the need for assistive ICT equipment. However, *TEVETA's Minimum Training Standards Guide* only requires training institutions to have disability policies which, according to experts, tend to focus on ensuring physical access for those with mobility challenges but rarely consider accommodation for other types of disabilities. As a result, learners with disabilities face barriers to enrollment, with institutions often providing accommodation only when explicitly required.

There are currently no policies or standards requiring training institutions to use digital devices for managing core administrative functions[7], resulting in inconsistent adoption across the TVET system. While TEVETA's Learner Data Management System (LDMS) mandates digital registration for examinations, this applies only to selected programs. For other tasks, institutions choose between manual and electronic processes, often relying on paper records. This leads to inefficiencies, higher risk of data loss, and limited capacity to generate insights, as paper-based systems hinder accurate tracking, secure storage, and data-driven decision-making.

ETRI-TVET Score for Device Policies

Government policies aimed at improving access to and use of computing devices in TVET institutions are limited in scope and enforcement. **Based on the assessment of three key topics—access, standards, and usability—the overall ETRI-TVET score for device policies is "Needs Improvement."** Institutions receive limited government support to acquire digital devices or form partnerships with private companies to finance such purchases. Existing standards in place for institutions to have digital devices are basic and broadly defined, with little attention to actual use or pedagogical integration. Enforcement is likely weak due to limited inspection capacity, and there is no mandate to monitor the proper functioning or maintenance of devices in public institutions. Measures to ensure usability, such as technical support for device operation, are non-existent. While government policies recognize the need to support learners with disabilities, there are no concrete efforts to ensure institutions provide the necessary accommodations. Since government efforts related to device access, standards, and usability remain limited, the device-policy score is at the "Needs Improvement" rating (Figure 3).

Figure 3 – Devices Policy Scores

Topic Scores			Pillar 1: Devices Policy Score
Access	Standards	Usability	

[7] Such as learner enrollment, attendance, performance tracking, certification, or instructor management.

Pillar 2 - Connectivity

The survey also gathered data on the policies that facilitate broad access to the Internet in TVET institutions focusing on three key areas. First, the availability of policies or programs to support connectivity in public and private institutions, including in rural or underserved areas. Second, the presence and enforcement of internet access and quality standards. Third, measures to ensure that internet services support their intended use, such as monitoring systems and technical support.

Topic 1: Access

The Zambian Government has taken important steps to expand internet access in public TVET institutions, particularly in rural and underserved areas, through a combination of strategic partnerships and infrastructure investments. These efforts have also included measures to make internet services more affordable for institutions. For over a decade, MoTS has led investments to improve connectivity. Building on those efforts, MoTS and ZICTA partnered with ZAMREN, a non-profit internet service provider for Zambian research and education entities, to provide connectivity to higher education institutions through the EDUROAM program. Some public TVET institutions such as Evelyn Hone and the Lusaka Business and Technical College, have benefited from this program. Smart Zambia, the E-Government Unit at the Cabinet Office, is also rolling out an internet service platform called GWAN (Government Wide Area Network), which plans to connect over 15,000 hotspots in hospitals and education institutions (including TVET ones) to enable internet access in rural areas. More recently, MoTS and Smart Zambia partnered with STARLINK, a satellite-based internet service provider, to connect to extend connectivity to all TVET institutions under the Ministry of Youth, Sport and Arts (MYSA), along with post offices, hospitals, and constituency offices. To support affordability, all three major government-led service platforms—ZAMREN, STARLINK, and GWAN—offer subsidized services. STARLINK is partly subsidized through the National Assembly, GWAN is supported by Smart Zambia and the Ministry of Finance, and ZAMREN receives government grants and provides services at discounted rates.

Topic 2: Standards

There are currently no formal standards requiring training institutions to provide internet access, although internet use is embedded in key learning outcomes. While TEVETA's registration requirements do not explicitly mention the availability of internet services, its mandatory computer appreciation module includes the ability to use email and internet services as a key learning outcome. This may influence institutions' decisions regarding connectivity. On one hand, it could encourage them to provide internet access to support the development of these skills using institutional devices. On the other hand, institutions might meet the requirement in alternative ways, such as relying on learners' personal mobile phones, without offering connectivity on their premises.

Measures to ensure internet access and quality in TVET institutions remained limited. While there are no formal internet access standards, TEVETA inspections often assess whether institutions have connectivity, particularly when programs require it. However, the scope and frequency of these inspections appear limited. First, as established before, scarcity of inspectors and financial resources prevents regular monitoring of all institutions. Second, inspections tend to check the presence of internet access, but not its use for pedagogical purposes. Third, inspections are unlikely to assess the quality of connectivity, such as speed or reliability.

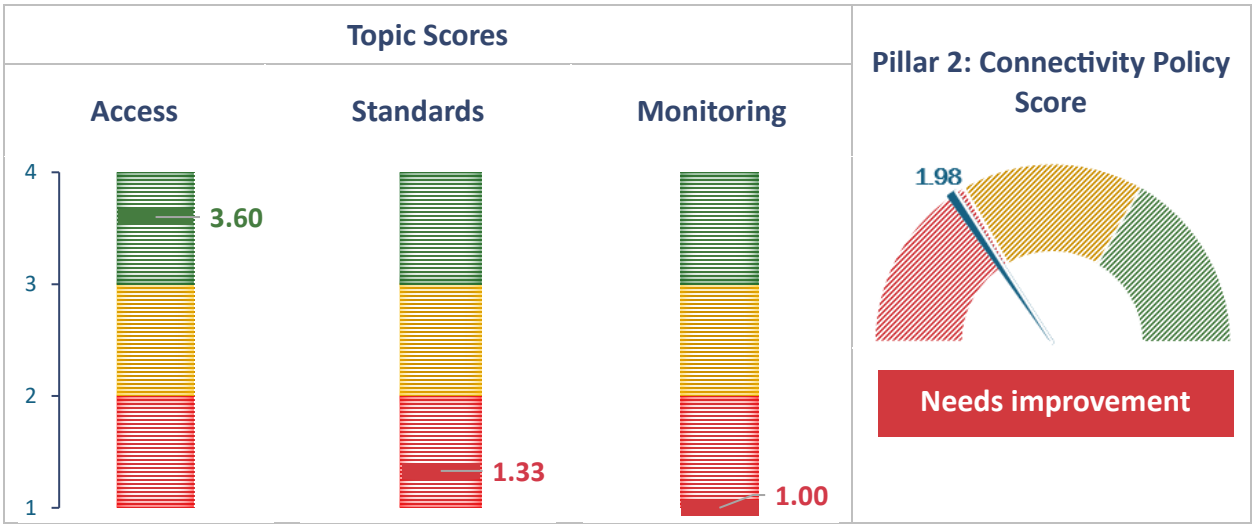
Topic 3: Monitoring

There are currently no measures in place to monitor internet availability across training institutions, or to provide support for connectivity problems. In the absence of regular and comprehensive inspections, a central system to monitor Internet access could help government authorities review access patterns and flag problems. According to experts, no such mechanism currently exists, nor is there a system for offering technical support to institutions. Support for connectivity issues is likely handled by internet service providers.

ETRI-TVET Score for Connectivity Policies

Some institutions benefit from programs that facilitate Internet access, but there are no accompanying standards or monitoring mechanisms. While the Government's partnerships—particularly in rural and underserved areas—demonstrate strong commitment to expanding connectivity, these efforts are not supported by system-wide standards or tools to monitor access across all public and private institutions. As a result, many public and private institutions not covered by these programs may lack adequate connectivity. As shown in Figure 4, the ETRI-TVET score reflects both the strength of targeted access initiatives and the absence of broader standards and monitoring, resulting in an overall rating of "Needs improvement" for connectivity policies.

Figure 4 – Connectivity Policy Scores



Pillar 3 - Instructors

The effective integration of digital technologies in TVET depends heavily on instructors, making their digital and pedagogical skills a key area of focus. ETRI-TVET collected data on Zambia's policies and practices to understand how instructors are supported in this regard. Instructors play a central role in the effective use of technology to enhance training delivery, yet many lack the necessary skills to use ICT confidently and effectively in the classroom. This topic examines whether the Government of Zambia has defined the digital skills required of TVET instructors and whether efforts have been made to assess current skill levels. It also explores existing policies, regulations, and practices aimed at building instructors' digital and pedagogical capacity during both pre-service and in-service training.

Topic 1: Competency Standards and Assessment

While Zambia has developed a digital competencies framework for teachers, its applicability to TVET instructors remain unclear. Digital competency frameworks help define the skills instructors need to: (1) strengthen their own ability to use digital technologies; (2) understand the digital skills learners need; and (3) adapt their pedagogical practices using ICT-enabled approaches. In 2023, the Government of Zambia took a first step in the right direction by developing a Technology-Enabled Learning Competency Framework that defines the necessary knowledge, skills and attitudes teachers should demonstrate to effectively integrate technology into their teaching. However, its relevance for TVET instructors and its use in shaping training programs, assessments, or recruitment criteria has yet to be defined.

Regular assessment of instructors' digital competencies is essential to ensure that training and support programs are aligned with actual needs. Yet there are currently no regulations or

standards requiring such assessments. Understanding instructors' digital skills needs is a cornerstone to transform their teaching practices through technology. Without periodic formal assessments, anchored in a shared understanding of the digital skills instructors must master, support efforts risk being supply-driven and less effective. Based on expert interviews and document reviews, no mechanisms or strategies currently exist to assess instructors' digital competencies in a systematic way.

Topic 2: Pre-service Digital Skills Development

Attracting and retaining instructors with advanced digital skills in ICT-intensive areas remains a key challenge for the TVET sector. Although national policies recognize this issue, there are currently no specific measures in place to address it. Recruitment and retention are difficult due to the working conditions that most training institutions offer, particularly when roles require specialized digital skills. Government intervention to attract individuals with these digital skills is therefore both important and necessary. Experts note that training institutions often face high turnover of ICT-skilled staff, largely due to comparatively lower salaries and less favorable working conditions than those offered in sectors such as banking, insurance or mining. Recognizing this challenge, the National TVET and ICT policies call for collaboration with the private sector to address instructor shortages, though concrete strategies or incentives to support implementation have yet to be developed.

While digital skills content has been incorporated into pre-service training programs, adapting curricula to keep pace with technological change remains a challenge. Pre-service training plays a critical role in preparing future instructors with the skills needed to integrate digital technologies into their teaching. However, teacher training colleges usually take a long time to adjust their curricula and keep up with technological change. Experts suggest that all TVET instructor training programs now include basic digital skills in their curricula to raise awareness of the benefits of technology for teaching and to ensure instructors can use devices and basic software effectively. Some institutions, such as the Technical and Vocational Teachers' College in Luanshya, have taken further steps by developing technology-enabled learning modules aimed at strengthening instructors' capacity to transform their teaching using ICT.

Topic 3: Professional Development

Some professional development opportunities are available to help instructors strengthen their digital skills and ICT-enabled teaching practices. These efforts are essential to support those who did not receive such training during pre-service education and to ensure that all instructors maintain up-to-date competencies. TEVETA regularly sponsors short-term courses with funding from the Government, international donors or the Skill Development Fund (SDF). MoTS, in partnership with international organizations such as the Commonwealth of Leaning, UNESCO, and

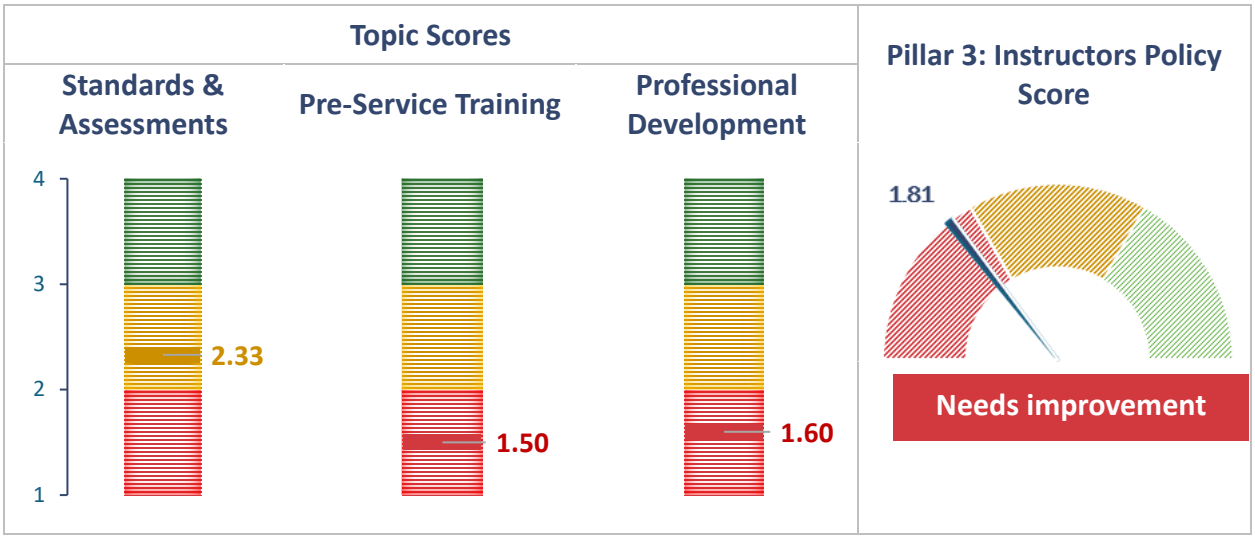
the Japanese and Chinese governments, also offer scholarships for TVET instructors to improve their basic and advanced digital skills.

Instructors face limited incentives, requirements, or support structures to engage in digital skills training, despite the availability of some professional development opportunities. Given demanding working conditions and competing responsibilities, many have limited capacity to take on additional tasks. To facilitate their engagement, government programs are usually mandatory or include incentives for teachers to enroll and complete training. Currently, once pre-service training is complete and the instructor is employed, there is no requirement to pursue further training in the use of ICT for teaching and learning as part of their continuing professional development. Likewise, there are no regulations or formal practices to incentivize or recognize instructors who invest in building their digital and ICT-enabled teaching skills. While individual institutions may have discretion to implement such incentives or recognition systems, there is no publicly available evidence of their existence. In addition, data on instructor participation and performance in TEVETA and MoTS professional development programs is either unavailable or not publicly accessible.

ETRI-TVET Score for Instructors Policies

There is a valuable opportunity to strengthen policies for instructors by clearly defining, assessing, and supporting the development of their digital skills. While a digital competencies framework for teachers has recently been developed, its implementation and applicability for TVET instructors remain unclear, especially as most instructor training curricula still focus on the development of basic digital skills. The absence of efforts to assess instructors' digital skills and scarce information about their participation and performance on instructor digital skills training programs creates an important information gap to understand the current strengths and needs, as well as to devise corrective measures. Although some professional development opportunities are being sponsored, the lack of measures to support and prioritize instructor participation suggests these initiatives may have limited impact on advancing the integration of digital technologies into teaching. As Figure 5 illustrates, the current gaps defining, assessing, and developing digital skills place instructor-related policies at the "Needs improvement" level.

Figure 5 – Instructors Policy Scores

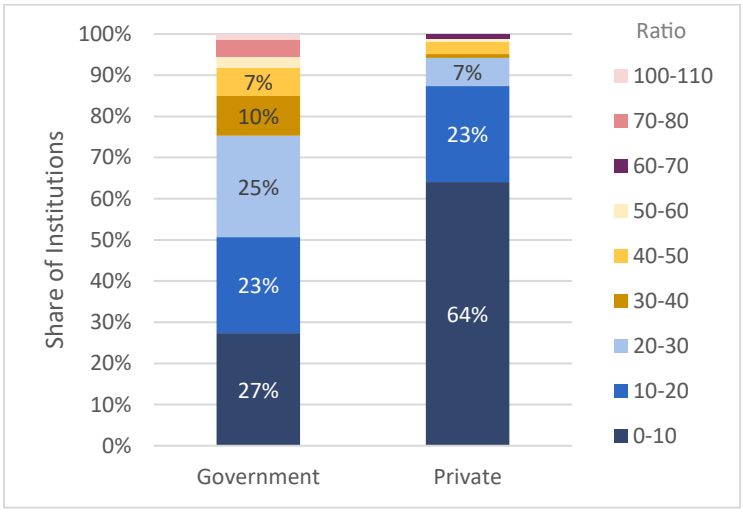


IV. EdTech Implementation in Practice: Key Findings

Enrollment

TVET institutions are generally small, with limited enrollment and staffing, resulting in high learner-to-instructor ratios. This imbalance is more evident in public institutions, where staffing levels do not always keep pace with enrollment. About 43 percent of institutions have fewer than 50 learners enrolled across programs, and 17 percent have between 50 and 100. Another 21 percent enroll between 100 and 600 learners, while the remaining 8 percent, mostly public institutions under MoTS, report enrollments ranging from 600 and 8,000. Private institutions are more likely to have lower enrollment levels than public ones. Instructor numbers follow a similar pattern: 37 percent of institutions have fewer than 4 instructors, 31 percent between 5 and 9, and 14 percent have between 10 and 14. The remaining third have between 15 and 108 instructors. However, staffing levels do not always increase in proportion to enrollment, resulting in large learner-to-instructor ratios. As shown in Figure 6, this is particularly evident in public institutions, where only 27 percent have a ratio below 10 learners per instructor, compared to 64 percent of private institutions.

Figure 6 – Learner-to-Instructor Ratio in Government and Private Institutions



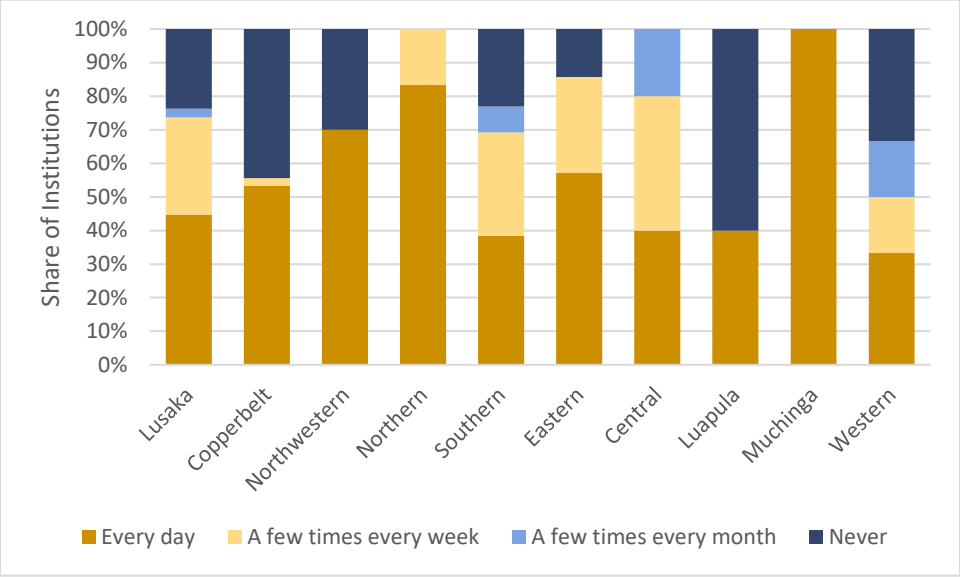
Most training institutions offer a limited number of programs, with public institutions tending to provide a broader range than private ones. There is also a notable discrepancy between self-reported data and official records on program offerings. Around 47 percent of institutions report offering between 1 to 3, and 25 percent offer between 4 and 6. Public institutions are more likely to offer a wide variety, with nearly 60 percent reporting more than 6 programs, compared to only a quarter of private ones. It is worth noting that, though this report relies on self-reported data,

these figures differ significantly from TEVETA's records of registered programs, which indicate a much higher number of institutions offering only one program.

Electricity

Electricity access remains a significant barrier to the consistent use of digital devices in training institutions, despite widespread grid connection. Many institutions rely on backup systems, but power availability is still limited in most cases. While most institutions are connected to the national grid, more than half also depend on backup sources to maintain access. Yet 65 percent report having electricity for less than 8 hours a day. When asked whether the availability or reliability of electricity prevented the use of digital devices, 51 percent reported that this occurs daily, and 18 percent said it happens a few times every week. As Figure 7 illustrates, this challenge is particularly prevalent in the Northern and Muchinga provinces. About one-third of institutions seem to have more reliable service: 27 percent report never having difficulties using devices due to power issues, and 3 percent experience such disruptions only a few times per month.

Figure 7 – Frequency of Lack of Electricity Preventing the Use of Digital Devices



Pillar 1 – Devices

Computing devices[8] are central for integrating ICT into training delivery, and their availability and use are key indicators of institutional readiness. As such, this pillar assesses not only the

[8] There are multiple definitions of what computing devices are, some center on their components, others on their capabilities. For this assessment, they are defined as "programmable electronic machines that can store, retrieve

presence of devices but also their usability and management within TVET institutions. Specifically, it examines three topics: (1) availability, (2) usability, and (3) the practices in place to manage available devices. Because TVET institutions provide trade-specific training, this pillar also looks at the availability and use of specialized equipment or software, such as 3-D printers, immersive technology devices, robots, among others.

Topic 1: Device Availability

Availability for learners

Ensuring access to computing devices for learning has long been a challenge, but it is increasingly viewed as a promising way to support educational outcomes. Some systems (particularly due to limited budgets for device procurement) have opted for controlled access models, where devices are confined to labs, and available at limited designated times (Internet Society, 2017). Others have invested in one-to-one laptop programs which research suggests, enable a meaningful engagement with technology (UNESCO, 2018), allow for better continuity of learning between school and home life experiences (Kolb, 2021), and have positive effects on the development of literacy and numeracy skills (Zheng, et al., 2016; World Bank, 2021a). These efforts typically include complementary investments in digital content, teacher training and support systems. While there is less extensive research on the use of computer-assisted learning (CAL) in TVET, recent evidence points to significant improvements in math scores and reduced course repetition (Angel-Urdinola, Avitabile, & Chinen, 2023). CAL also holds promise as a tool for inclusion, offering remedial education for learners with limited foundational numeracy or literacy skills and more engaging content for those who struggle in traditional learning environments (World Bank, 2021a).

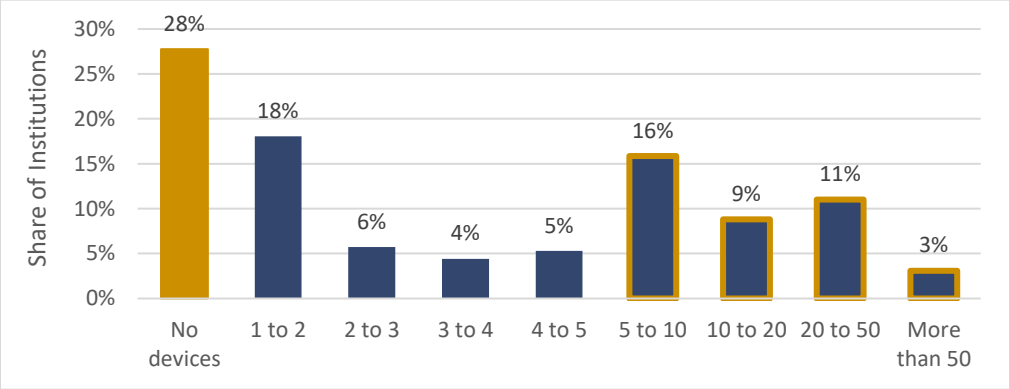
In Zambia, device availability for learners remains limited across institutions, as reflected in high learner-to-computer ratios[9]. Access is especially constrained in smaller, private institutions and certain provinces. Twenty-eight percent of institutions lack devices for learners—most are small (low enrollment), privately run, and offer lower-level certificates. This situation is more prevalent in the provinces of Muchinga and Copperbelt, where 50 percent and 40 percent of institutions, respectively, lack devices for learners. Even where devices are available, many institutions offer too few for adequate student exposure and practice, both essential to developing digital skills. As shown in Figure 8, about 39 percent of institutions have only one

data, process data, and share information in a highly structured manner" (ITU, 2022).Complementary definitions converge on describing computing devices as objects (such as desktop and laptop computers, smartphones, tablets, and peripheral connected equipment) that can perform at least four actions: 1) perform computations, 2) manipulate and transform data, 3) store and retrieve data, and 4) execute commands or instructions to perform specific tasks.

[9] The learner-to-computer ratio, a measure globally used to capture the different levels of access that education settings may offer to students (ITU, 2022).

device per five or more learners.[10] Higher learner-to-device ratios are more common in public institutions—one-third report one device per 20 or more learners—and in those offering higher-level qualifications, with nearly 20 percent of diploma-granting institutions having one device per more than 50 learners. Such high ratios are especially concentrated in the Eastern and Western provinces.

Figure 8 – Learner-to-Device Ratio Across Institutions (% of Institutions)



Access to devices for learners with disabilities remains very limited across institutions. Almost 80 percent report that they do not have any devices adapted for learners with disabilities. Based on existing literature, several adaptations can improve access for students with disability including: (1) assistive technologies (e.g., screen readers, text-to-speech, voice recognition); (2) alternative input devices (e.g., adaptive keyboards, eye-tracking systems); (3) ergonomic adjustments (e.g., adjustable desks, specialized seating); (4) software modifications (e.g., customizable interfaces, high-contrast displays); and (5) personalized learning tools (e.g., graphic organizers, word prediction software).[11]

Availability for instructors

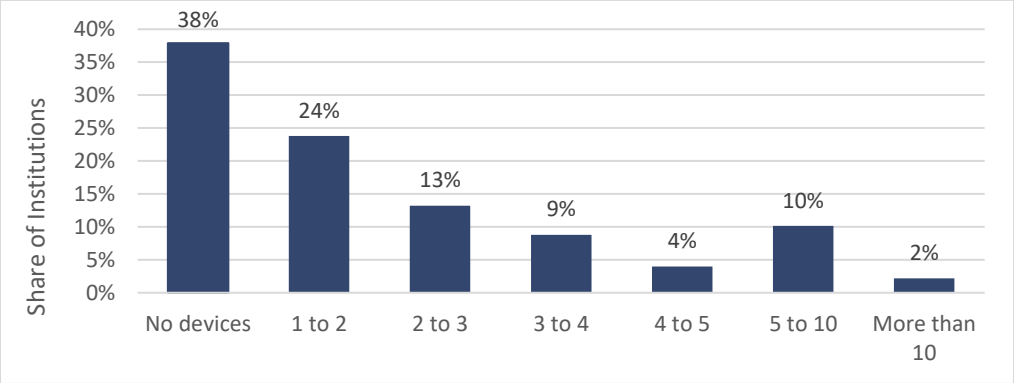
Access to computing devices for instructors remains limited, posing a barrier to the effective integration of ICT into teaching. While research shows that device distribution alone does not guarantee use (Gökmen & Duman, 2018), providing instructors with access is a necessary first step toward meaningful ICT integration (Broussard, Et. Al. 2014). Survey results indicate that 38

[10] Learner-to-device ratios were not calculated using all learners but only those enrolled in programs that require the use of digital devices, as reported by institutions.

[11] University of Washington (2022). "Working Together: People with Disabilities and Computer Technology". College of Engineering, Washington State, United States.

percent of institutions in Zambia do not have devices designated for instructor use—regardless of ownership, grade, or certification level (Figure 9).[12]

Figure 9 – Instructor-to-Device Ratio



Availability for administrative staff

Functioning devices for administrative staff also play an important role in supporting the broader delivery of training. While not directly tied to instruction, ICT use in administrative functions helps create the conditions for more efficient institutional operations. Reliable access to digital tools enables improved filing, record keeping, and processing of key tasks related to managing human, financial, and physical resources (World Bank 2021a; UIS, 2016; OECD 2023a). Also, institutions that do not offer devices to instructors or students often report relying on administrative devices for selected teaching and learning activities.

About 52 percent of institutions reported having enough devices for administrative staff, a higher share than those with devices for teaching and learning. Several factors help explain this pattern. First, the perceived return on investment may be higher, as fewer devices can deliver immediate and measurable results in functions such as record keeping, reporting, and budget management. Second, the infrastructure demands are more manageable, as administrative devices can be housed in a single, well-equipped location with stable electricity, internet access, and controlled entry. Third, uptake is often easier, as few staff need training to use standardized software.

[12] Device access is particularly limited in Muchinga, Southern, and Western provinces, where between 43 and 100 percent of institutions lack devices for instructors. In contrast, institutions in Northwestern, Luapula, and Lusaka are more likely to provide such access, with over half reporting one device for every 1 to 5 instructors.

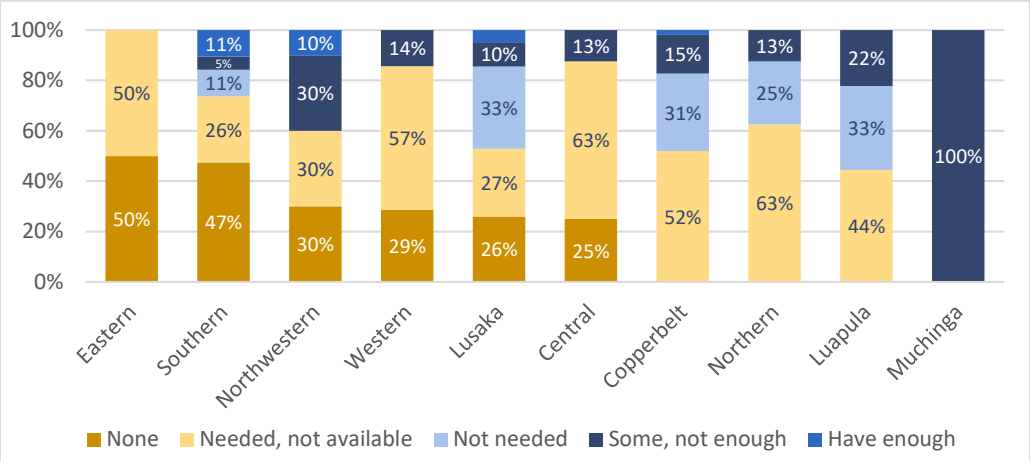
Availability of Specialized Equipment or Software[13]

Integrating specialized equipment and software into TVET has the potential to enhance learning outcomes and better prepare students for evolving labor market demands. While the impact varies by technology, occupational field, and context, evidence highlights promising benefits when such tools are used effectively. For example, immersive technologies have been shown to outperform traditional methods in developing technical, practical, and socio-emotional skills (World Bank, 2021b). Recent evidence from Ecuador also reveals that incorporating mixed reality into auto-mechanics training significantly improved student learning, with gains driven by increased engagement and motivation (Angel-Urdinola & Chinen, 2025). Likewise, 3D printing has been found to support learning, increase engagement among students and teachers, and improve perceptions of STEM subjects and careers (Ford & Minshall, 2018). Beyond learning gains, ensuring students are familiar with technologies increasingly used in the workplace—such as robotics in manufacturing, construction, and agriculture—is essential. With the adoption of such tools growing rapidly over the past decade (Müller, 2023; FAO, 2022, KPMG, 2023), aligning training with industry practices helps ensure graduates are well equipped for employment.

Specialized digital equipment is largely absent in Zambian training institutions with approximately 83 percent reporting that they have none (Figure 10). Nearly half of them, predominantly public institutions, express a need for such equipment. In contrast, about one-third, mostly small and private institutions offering only skills awards, report that the lack of equipment reflects limited demand or necessity. Around 13 percent report having some, though insufficient, specialized equipment. These tend to have relatively high enrollment. Only 4 percent of institutions report having an adequate supply of both equipment and software to meet their needs.

[13] Specialized digital equipment refers to advanced tools designed for training in specific occupational field. This equipment is used to simulate real-world work environments, provide hands-on practice with industry-standard technology. Examples include 3D printers, industrial robots, immersive technologies such as virtual reality (VR) and augmented reality (AR), and welding simulators.

Figure 10 - Availability of Specialized Equipment and Software by Province

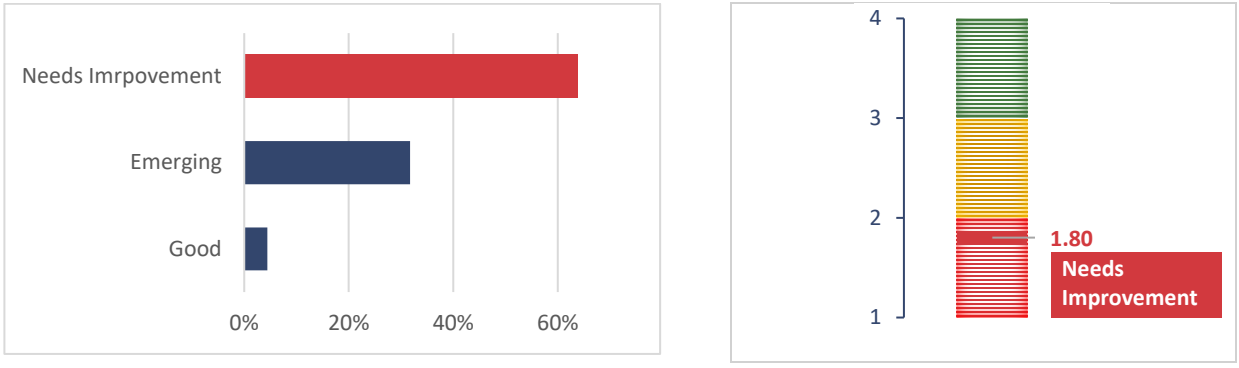


Two patterns are notable. First, while a few institutions in the Southern, Northwest, and Lusaka provinces report having adequate specialized equipment and software, none in the Eastern province have access to these resources. In the Central, Western, Northern, and Copperbelt provinces, more than half of institutions report needing but lacking such equipment (Figure 10). Second, TEVETA's grading appears to reflect the absence of specialized equipment and software more than other factors, such as the availability of computing devices or electricity. About half of grade one institutions have some or enough of these resources, whereas 56 percent of grade two and 65 percent of grade three institutions report having none.

Device Availability Topic Score

The overall limited access to devices for teaching and learning purposes places most institutions—and thus the *device-availability* topic—at the "Needs Improvement" level (Figure 11). While nearly all institutions report having computing devices, many use them predominantly for administrative tasks. In almost one-third of institutions, learners do not have access to devices, and 39 percent report having too few to support regular or sustained pedagogical use. Instructors appear to be even more affected, with 38 percent of institutions lacking dedicated devices for them. They likely have sporadic access to administrative computers. Access to specialized digital equipment remains rare.

Figure 11 – Device Availability Topic Score



Topic 2: Device Usability

While access to computing devices and specialized digital equipment is essential for ICT integration in TVET education, it is not enough on its own—how these tools are used is equally important. To fully realize the benefits of technology, both availability and effective usage must be considered. Education systems often report favorable student-to-device ratios, yet survey data show much lower actual usage rates in practice (UNESCO, 2018). ETRI-TVET explores usability by looking at three factors: how learners and instructors access devices, the estimated hours of use, and the perceived computing capacity of devices.

Access to Devices

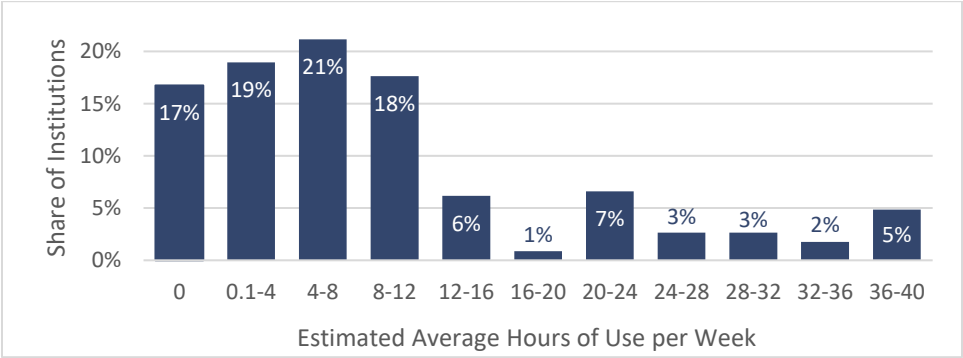
Devices for pedagogical use are mostly accessed in designated spaces such as computer labs (Figure 12). About 91 percent of the institutions that have devices for learners make them available in these labs. The few institutions that do not, mainly those offering skills awards programs, use alternative approaches such as bringing devices into classrooms when needed, lending them to students, or relying on learners' personal devices. Instructor access to devices is slightly different. About half of the institutions with devices for instructors make them accessible in staff or instructors' rooms, typically in larger public institutions. About 20 percent, mostly smaller private institutions, provide instructors with personal devices. Others rely on lab access (19 percent) or instructors using their own devices (12 percent).

Figure 12 – Device Access Methods (% of Institutions)

Hours of Use

Learner use of computing devices is limited, even in programs where digital access is expected. Usage varies by institution type, enrollment size, and program area. Because TVET institutions offer diverse training programs, ETRI-TVET asked each to report on the program with the highest device usage and estimate learners' weekly usage. As shown in Figure 13, even in the best-case scenario, 17 percent of learners do not use devices at all, 19 percent use them for less than 4 hours per week, and 21 percent for no more than 8 hours. Learners in private institutions with low enrollment and those in programs offering skills awards are less likely to use devices. In contrast, higher usage is reported in programs related to technology and marketing/entrepreneurship, while usage is lower in agriculture and construction programs.

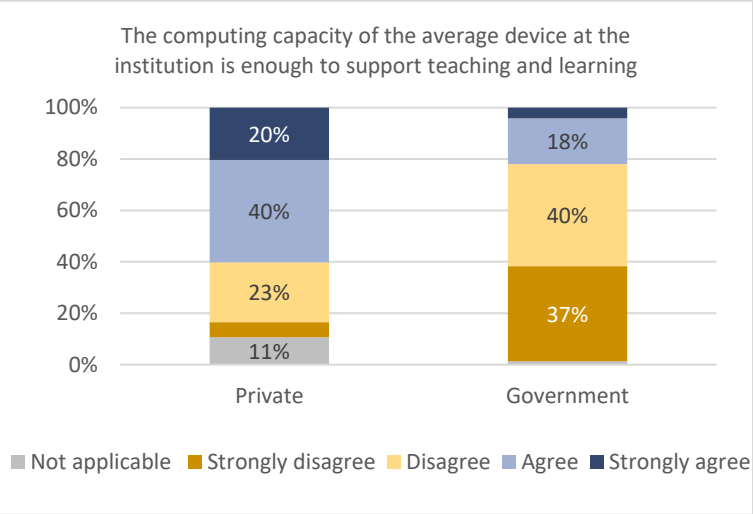
Figure 13 – Hours of Learner Device Usage in the Most Tech-Intensive Program



Computing Capacity

Perceived computing capacity also tends to be lower in government institutions compared to private ones (see Figure 14)**.** About 77 percent of government institutions reported that the average device lacked sufficient capacity to support teaching and learning, compared to 29 percent of private institutions.

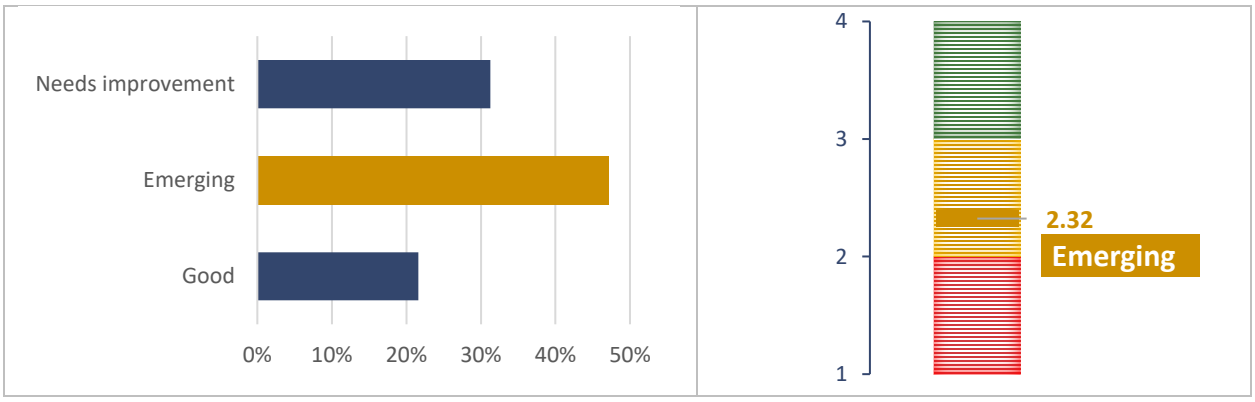
Figure 14 – Perceived Computing Capacity of Public vs. Private Institutions



Device Usability Topic Score

Limited use of devices for pedagogical purposes, combined with mixed perception of computing capacity, places most institutions, and therefore the *device-usability* topic, at the "Emerging" level. Devices for pedagogical use are typically accessed in designated rooms—computer labs for learners and staff rooms for instructors. Learners use devices sparingly, even in the most tech-intensive programs. Large public institutions often report insufficient computing capacity, whereas small private institutions tend to rate their computing capacity more positively (Figure 15).

Figure 15 – Device Usability Topic Score



Topic 3: Device Management

How digital devices are managed affects their availability, usability, and overall effectiveness in supporting teaching and learning. In many contexts, devices remain unused due to management challenges—such as donated equipment that is never deployed, or devices that are damaged or obsolete but not repaired or replaced (UNESCO, 2023).[14] This topic explores whether institutions take measures to ensure device availability and functionality over the medium and long term by looking at two factors. First, the stability of funds to procure devices, and second, the availability of technical support for maintenance and troubleshooting. Beyond procurement and maintenance, global experts agree that the integration of ICT into TVET delivery must be guided by evidence of its effects on learning. Accordingly, this topic also looks at whether institutions gather such evidence.

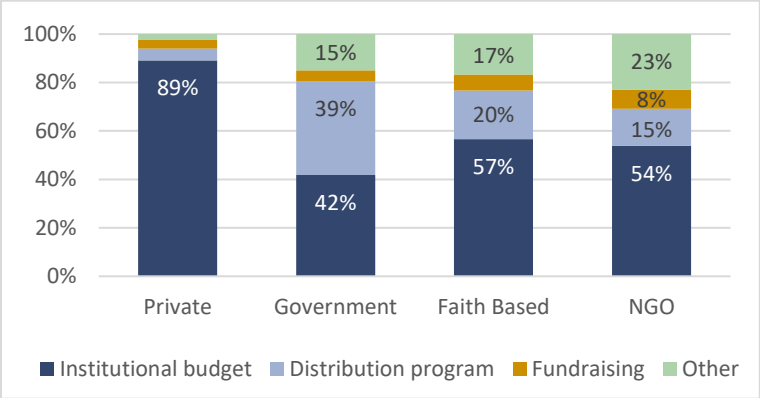
Procurement Funds

Ensuring equitable access to digital devices for all learners is a widely shared global priority. To meet this goal, governments have adopted various strategies to expand device access across education and training systems. These includes direct distribution of computing devices (particularly in public education and training institutions), support for device procurement, and the development of access and quality standards (UNESCO, 2022b; OECD, 2023b). At the institutional level, implementation can take different forms, ranging from one-time donations that address immediate needs to recurring budget allocations that offer a more stable and sustainable funding source aligned with evolving requirements.

The majority of institutions have used their own budgets to procure devices—89 percent of private, 42 percent of public, 57 percent of faith-based, and 54 percent of NGO-run institutions. Fewer rely on distribution programs, some of which have been supported by ZICTA , CDF, and GIZ (Figure 16).

[14] The 2023 Global Education Monitoring Report illustrates two cases: In Rwanda, laptops from the One Laptop Per Child program were often stolen or left unrepaired, and the Auditor General deemed the program ineffective and poor use of public funds. In Ghana the program was suspended after three years because basic sustainability and feasibility conditions, such as power supply, device durability, and costs of connectivity and maintenance (UNESCO, 2023).

Figure 16 – Device Procurement Methods[15] by Type of Institution



Technical Support

Reliable technical support is another important condition to enable the effective use of computing and other devices for teaching and learning. **Without it, institutions risk falling back to traditional methods due to poorly maintained or malfunctioning equipment.** When devices are not functional, teachers and students struggle to complete tasks using digital tools. Beyond keeping devices up to date and operational, technical support plays a key role in helping educators resolve issues quickly, which in turn strengthens their capacity and confidence to integrate digital technologies into instruction (UNESCO, 2022a).

Technical support is available in about half of TVET institutions, though satisfaction varies by institution type and device access. About half of institutions report being satisfied with the support available to keep digital devices operational. Institutions with higher learner- and instructor-to-device ratios tend to be more critical, as do public and faith-based institutions. Overall, most institutional leaders reported that 80 to 100 percent of their devices were functioning well at the time of the survey. A similar pattern applies to specialized digital equipment—about half of the institutions using such technologies believe they have sufficient technical support to sustain their use.

Evaluation of Impact

Regularly reviewing the quality and impact of ICT integration is a key management practice for training institutions. These reviews help leaders strengthen effective practices and adapt to evolving needs and technologies. According to the European Commission (2015), such reflection enables institutions to recalibrate incentives, refine strategies, and build on what works. This topic

[15] This figure illustrates the answers of the 193 TVET institutions that reported having at least one device for learners and/or instructors.

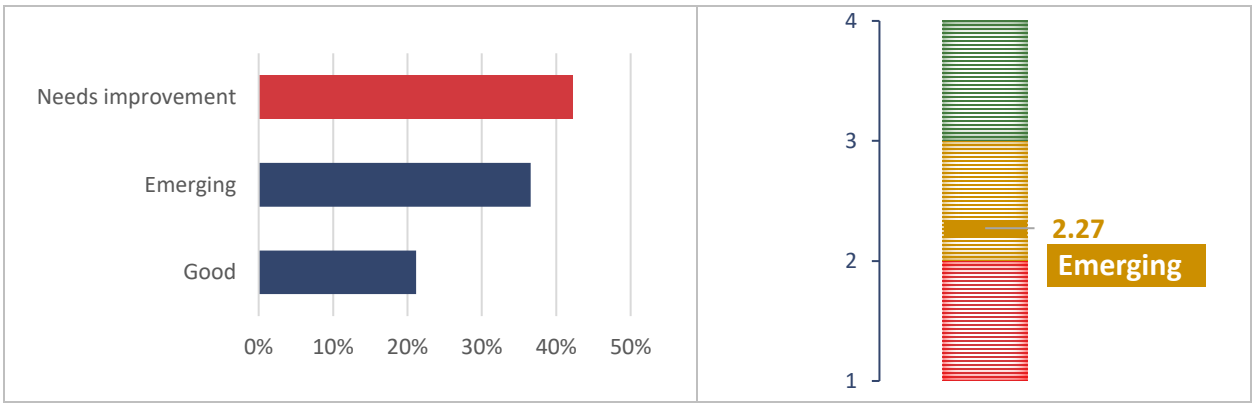
examines whether TVET institutions in Zambia undertake such reviews as part of their ICT integration efforts.

More than 80 percent of the institutions report assessing whether the use of digital devices and equipment improves learning outcomes. This pattern holds across institution type, location, grade, size, or certification level. While encouraging, it is not evident how formal, robust, or regular these assessments are in practice.

Device Management Topic Score

Positive, yet heterogeneous, management practices place the overall *device-management* topic at the "Emerging Level" (Figure 17)**.** Two-thirds of TVET institutions have used their budget to procure devices, which may suggest some degree of autonomy and stability as compared to other procurement mechanisms. However, budget allocations remain insufficient to enable widespread device use for teaching and learning. About half of TVET institutions are satisfied with available technical support, leaving the rest at risk of reduced access as devices deteriorate. Over 80 percent report assessing whether digital devices and equipment improve learning outcomes, though it is unclear whether these evaluations go beyond anecdotal evidence or lead to corrective actions.

Figure 17 – Device Management Topic Score

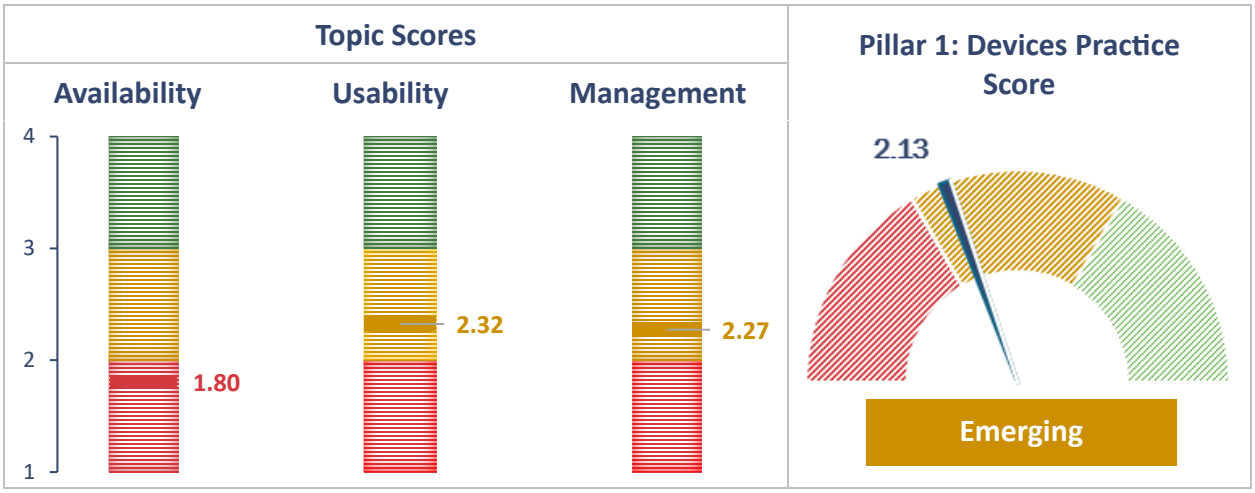


Overall Devices Score

Because digital devices for pedagogical purposes are largely inaccessible in TVET institutions, the Devices pillar score falls at the low end of the "Emerging Level" (Figure 18). Limited availability and high student-to-device ratios further constrain use. At least one-third of institutions do not have any devices for instructors or learners, and in many others, devices are confined to designated rooms with controlled access. In the programs with the most extensive use, the average student receives less than eight hours of computer time per week in 40 percent of the institutions, and no access in 17 percent. Although 65 percent of institutions allocate

budget to procure devices, these resources remain insufficient to enable widespread use for teaching and learning.

Figure 18 – Devices Practice Scores



Pillar 2 - Connectivity

Internet connectivity is important for expanding the potential of computing devices. While offline use can still support digital skill development, connectivity expands the educational value of devices in at least four areas (Internet Society, 2017):

- **Availability of resources**. Connectivity allows access to online textbooks, open educational resources, MOOCs, educational and occupational websites, etc. These resources are often more affordable than printed materials.
- **Quality of resources**. Learners and instructors can access up-to-date, interactive and industry-relevant resources from reputable education and training providers.
- **Access to training**. Online training offers flexibility in time and location, helping overcome barriers for groups such as women, disabled people, early school leavers, adult learners, and instructors.
- **Communication**. Connectivity enhances communication within institutions (among leaders, instructors, and learners), and with external partners such as on-the-job instructors, industry experts, and companies.

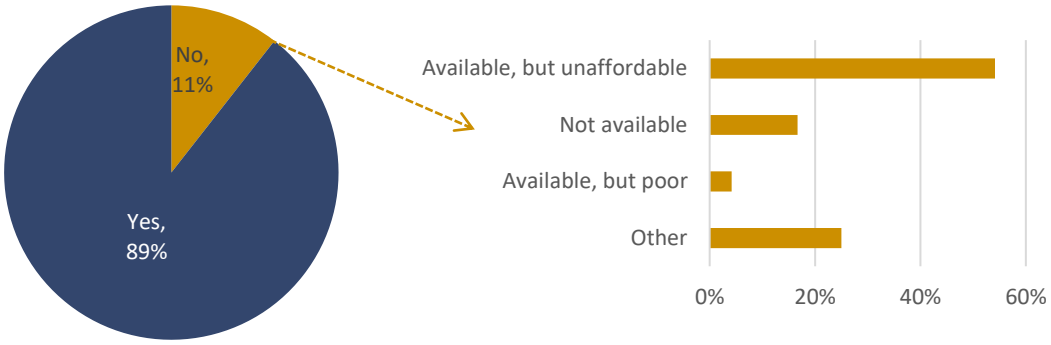
The Connectivity Pillar assesses the readiness among TVET institutions to connect students, teachers, and staff to the Internet. It tracks three aspects: 1) Internet access, 2) usability, and 3) management to ensure continued access.

Topic 1: Internet Access

Connectivity has become a critical enabler of education and training, with its importance underscored during COVID-19 when remote learning was essential to mitigate the impact of TVET institution closures. Many countries, particularly those with large TVET enrollments and pre-existing infrastructure, expanded online learning platforms, video channels, and collaboration tools to address the crisis (World Bank, 2020). Others made more modest efforts, including investing in devices and making training content available remotely. Still, recent data show that 21 percent of youth aged 14-25 do not use the Internet, and 63 percent lack Internet access at home. In Africa, these figures rise to 47 percent and 88 percent, respectively (ITU, 2023; ITU & UNICEF, 2020). ZICTA's 2022 National Survey shows limited internet access in Zambia: 33 percent of households report internet service, 9.5 percent own a computer, and 80.7 percent own a mobile phone (ZICTA, 2023). Access is likely even lower among TVET learners due to socioeconomic constraints, making institutional internet access the primary gateway for learners to benefit from online content.

89 percent of TVET institutions in Zambia report having internet access, reflecting encouraging progress toward connectivity goals. The remaining 11 percent cite unaffordability and a lack of service availability as the main barriers (Figure 19). The share of institutions without Internet is relatively higher among faith-based institutions, those operating in Luapula, Central, and Northern provinces, and those offering Trade Test Certificate Level programs. Limited access is also associated with higher learner and instructor-to-device ratios, suggesting that institutions with fewer devices per person are less likely to prioritize or afford connectivity. This may stem from financial constraints, limited ICT investment, or the perception that internet access is less necessary when devices are rarely used.

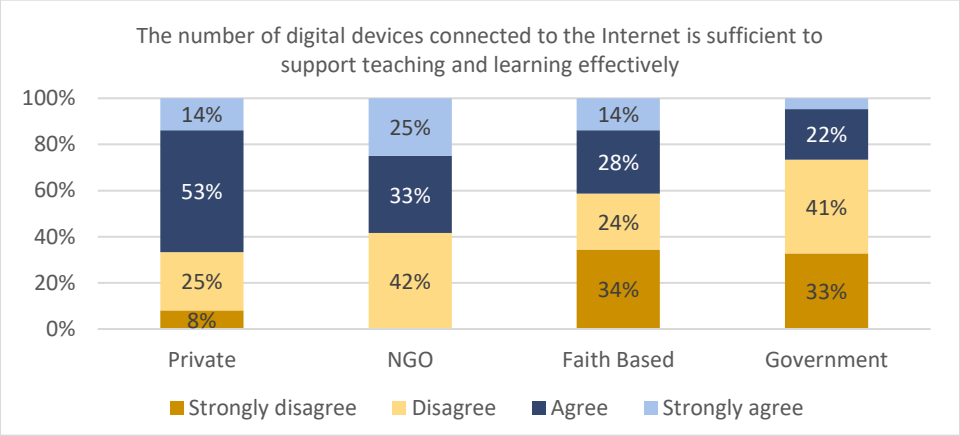
Figure 19 – Access to the Internet



But institutional Internet access does not always guarantee access to online content for educational purposes. About half of all training institutions report that the number of connected devices is insufficient to support instructional needs (Figure 20). This challenge is more common

among large, public, grade 2 and 3 facilities, situated outside Lusaka and Copperbelt provinces. One potential workaround is allowing instructors and learners to connect their personal devices to the institutional network—a practice permitted in 82 percent of institutions for instructors and 63 percent for learners. However, most TVET learners lack suitable devices, limiting the impact of this practice.

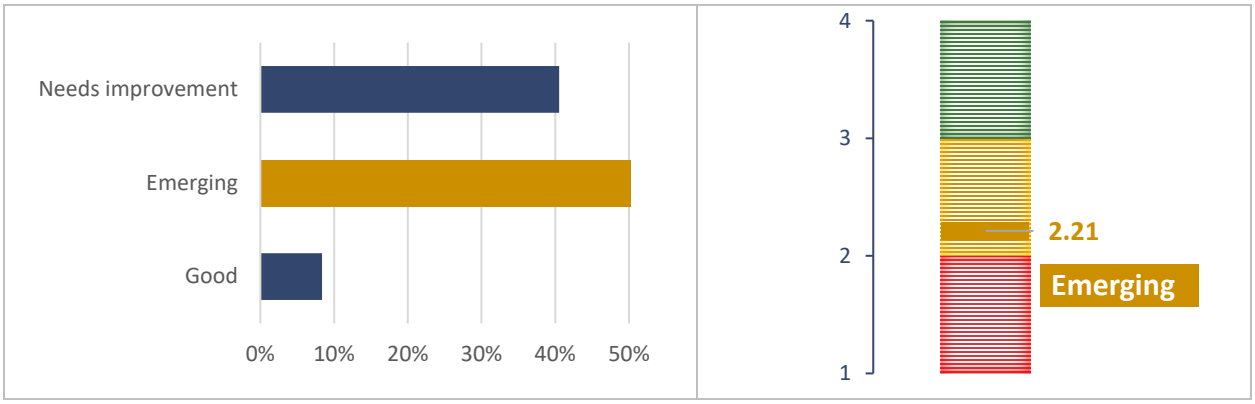
Figure 20 – Perceived sufficiency of Internet access to support teaching and learning



Internet Access Scores

A mix of available connectivity but seemingly limited access for teaching and learning places most institutions, and thus the *internet-access* topic at the "Emerging" level (Figure 21)**.** Nearly 90 percent of institutions report being connected to the internet, a crucial first step in incorporating online resources into training delivery. However, a significant portion expresses concern that the number of connected devices is insufficient to support effective teaching and learning. While an important share of institutions report allowing instructors and, to a lesser extent, learners, to connect their personal devices, the low levels of device ownership reported by ZICTA indicate that this practice may only provide a marginal benefit for instructors but little to no impact on learners' access.

Figure 21 – Internet Access Topic Score



Topic 2: Internet Usability

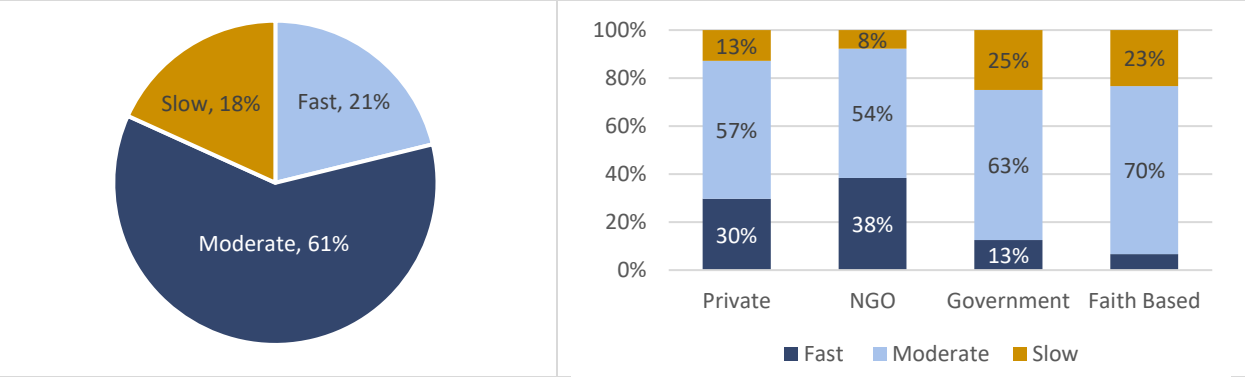
The quality of connectivity—not just its presence—determines whether it supports or hinders digital learning. While some forms of internet access can support teaching and learning, others may lead to frustration and a preference for traditional pen-and-paper methods (Hughes & Read, 2018; Chen, Et. Al. 2011). In some countries, institutions rely on narrowband networks which, unlike broadband, cannot support high-data content or personal device connections (Internet Society, 2017). Speed also matters which can range from below 256 kbps in narrowband networks which is insufficient for most educational content online, to over 280 Mbps, the average in Singapore, the fastest broadband country in 2024.[16] This topic explores connection type, speed, and stability to assess whether connectivity enables meaningful use of online educational content and tools.

More than 75 percent of TVET institutions report using broadband internet connection, but a minority still rely on narrowband. Institutions were asked to indicate whether their internet connection was broadband (e.g., cable modem, fiber, satellite, Ethernet LANs, Wireless LAN, WiMAX), or a narrowband (e.g., analog modem). About 18 percent report using a narrowband, mostly small, private institutions offering Skills Award programs in Lusaka. All institutions using narrowband connections are in Lusaka, Copperbelt, and Southern provinces. Only 4 percent of institutions were unable to specify the type of Internet connection.

[16] ETRI-TVET includes a range of speed options between 256 Kbps and 21+ Mbps, using multiple reference points. The first is UIS's 2019 Practical Guide to Implement Surveys on ICT Use in Primary and Secondary Schools, which uses a similar but more detailed range. It also takes into consideration the United States Federal Communications Commission, which in 2022 estimated the appropriate broadband speed for students at 5-25 Mbps, and the average speeds in various European countries as reported by the European Union Best Practice Report on Competitive Broadband and the European Commission's Digital Education Action Plan 2021-2027.

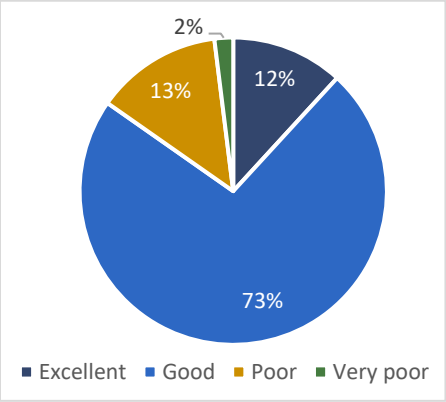
Most institutions perceive their Internet speed as moderate, though slow connections remain common in certain regions and institution types. About 60 percent of institutions report a moderate speed that takes 30 seconds to a minute to open a web page (Figure 22). A little over 20 percent rate their internet speed as fast, with pages loading in under 30 seconds. The internet connection is slow in 18 percent of the institutions and takes more than a minute to open a page. The share of institutions with a slow connection is relatively larger in public and faith-based institutions (25 and 23 percent, respectively), and those in the Luapula and Western provinces (50 and 47 percent respectively).

Figure 22 – Internet Speed



More than 70 percent of institutions rate the reliability of their connection as "Good", indicating that it is generally functional but with occasional outages. However, reliability ratings vary widely across institutions. About 13 percent report their connection as "Excellent", because it is consistently available without disruptions. In contrast, 12 percent rate it as "Poor" due to frequent connectivity issues that hinder use, and 2 percent describe it as "Very poor", meaning that the connection is almost unusable or consistently unavailable (See Figure 23). Two trends are notable. First, institutions with "Excellent" connections are primarily located in the Northwestern, Western, Lusaka, and Copperbelt provinces. Second, the highest shares of "Poor" and "Very Poor" ratings are among institutions offering Trade Test Certificate and Diploma-level training (40 and 27 percent respectively).

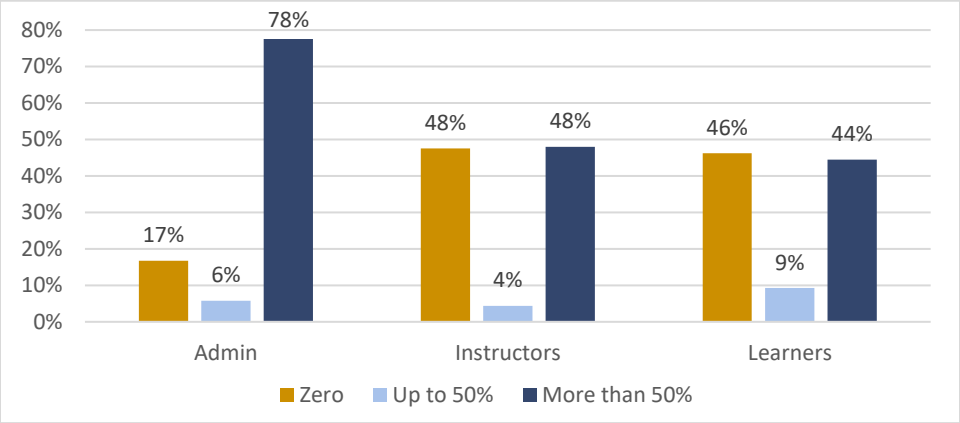
Figure 23 – Internet Reliability



Not all devices are connected, restricting the effective use of the Internet for teaching and learning (Figure 24). Most training institutions prioritize administrative staff, with 78 percent reporting that the majority of administrative devices are connected—regardless of institution type, location, training level, or size. In contrast, only 48 percent indicate that most instructors' devices are connected. Connectivity in this case varies. For example, 40 percent to 50 percent of institutions offering lower-level training do not provide internet access to instructors' devices, whereas this share drops to around 20 percent for institutions offering diploma-level training. Similarly, nearly 70 percent with fewer than 10 learners do not connect instructors' devices, but this figure drops to 40 percent for those with 21-30 learners and 30 percent for institutions with over 50 learners.

Connectivity for learners' devices also varies. While 44 percent of institutions report sufficient internet access for learners' devices, almost 40 percent of private institutions do not connect any learner devices, compared to only 15 percent of public institutions. As with instructors' devices, lack of internet access is more common in smaller institutions than those offering lower training levels.

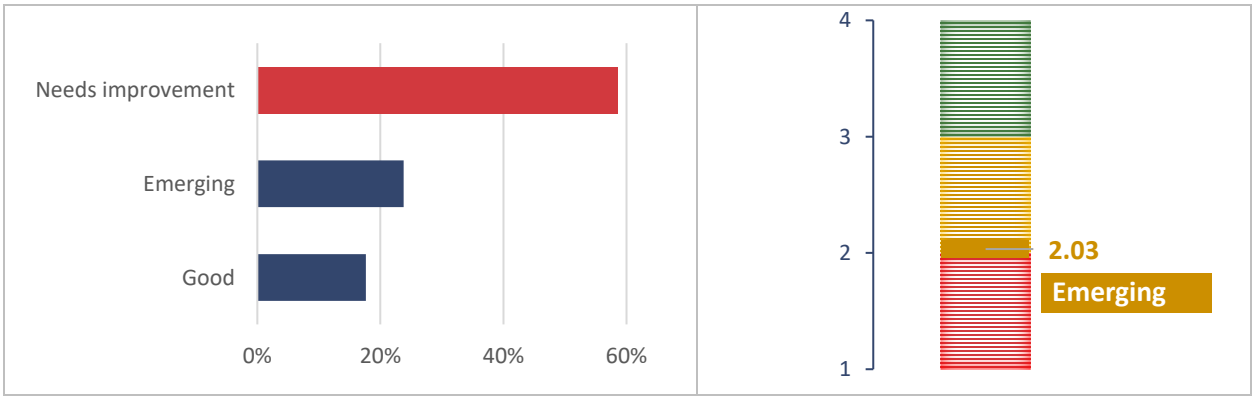
Figure 24 – Share of Devices Connected to the Internet, by User Type



Internet Usability Topic Score

Because the relatively fast and reliable connectivity seems to serve mostly administrative purposes, this topic stand at the "Emerging" level (See Figure 25)**.** The majority of institutions have a broadband internet connection that is perceived as moderately fast and stable, all good conditions to support access to a wide array of educational resources. However, most institutions appear to prioritize connecting administrative devices to the internet. Instructors' and learners' devices lack internet access in half of the institutions which, combined with the scarcity of computing devices for pedagogical purposes, suggests the need for significant improvements in both areas to make the integration of ICT into training delivery possible.

Figure 25 – Internet Usability Topic Score



Topic 3: Connectivity Management

The management of Internet services affects its availability, usability, and effectiveness in connecting TVET instructors and learners to the online world. For almost a decade, most

governments have agreed that equal access to Internet connectivity is a precondition for the use of ICT for skills development (UNESCO, 2022a). In addition to overcoming important limitations to connectivity in general (e.g., infrastructure, geography, cost), governments have attempted to increase access to the Internet for educational purposes by connecting schools and subsidizing costs, either through stand-alone programs and partnerships or longer-term funding mechanisms such as Universal Service Funds (EIU, 2021). This topic assesses whether TVET institutions are aware of such government efforts and examines three key aspects of internet service management that affect accessibility and usability: payment, monitoring, and technical support.

While connectivity is widely recognized as a requirement for training institutions, support to meet this expectation appears limited. Awareness of government programs to facilitate internet access remains low, particularly among private providers. Only 15 percent of institutions, mostly public, are aware of government programs to facilitate internet access in TVET providers. But most institutions understand that connectivity is a requirement enforceable by government authorities. About 68 percent report having undergone formal inspections that check their connectivity. The regularity of these inspections and the extent to which they motivate institutions to closely monitor internet availability are unclear. Among the remaining third of institutions, some are not expected to monitor connectivity at all, while others do so through self-reporting mechanisms.

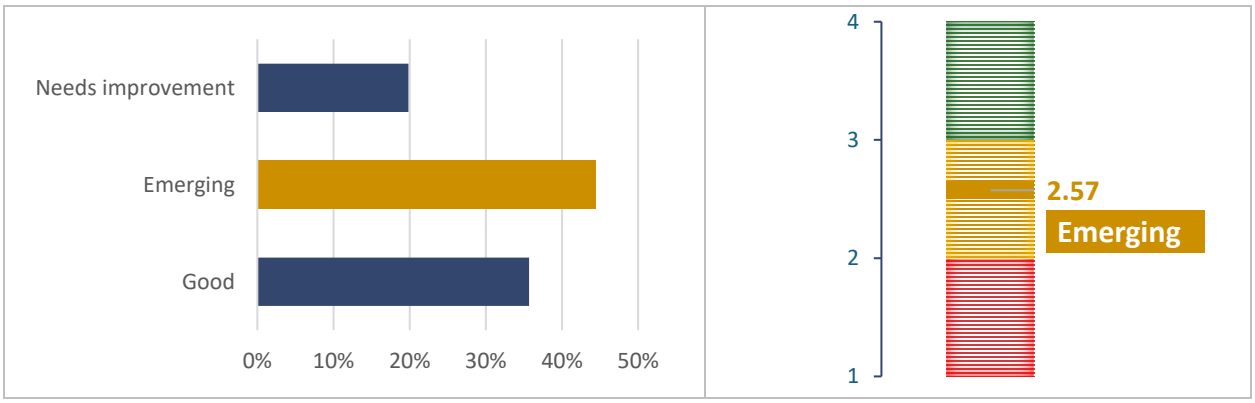
While two-thirds of training institutions can consistently pay for internet service and have adequate technical support, **a significant share continues to face affordability challenges.** Sustained access often depends on institutions' financial capacity to cover recurring costs. Internet services are usually provided for a fee, meaning continued access depends on the institution's ability to cover its costs. Half of the 67 percent of institutions that can afford the service without difficulty are private institutions offering Level 3 Certificates. These institutions report having enough technical support to ensure that the Internet works properly, likely from the service provider. For 22 percent of institutions, covering internet bills is a persistent challenge, with payments rarely being made on time, while another 3 percent report paying about half of their bills on time. This suggests that at least a quarter of institutions may have discontinued access month by month and potentially incur extra reconnection charges. The share of institutions struggling with this issue is higher in Lusaka and Copperbelt provinces.

Internet Management Scores

An overall ability to pay but limited mechanisms to monitor proper functioning places most institutions and this topic at the "Emerging Level" (Figure 26). The high percentage of institutions that can cover their internet costs and have the technical support they need is a positive sign that access to the internet can be sustained over time. However, the fact that this is not the case for

all institutions shows that there is still room for improvement. Additionally, the lack of mechanisms to monitor functionality places institutions in a reactive position, only tackling challenges when the service is already disrupted or insufficient.

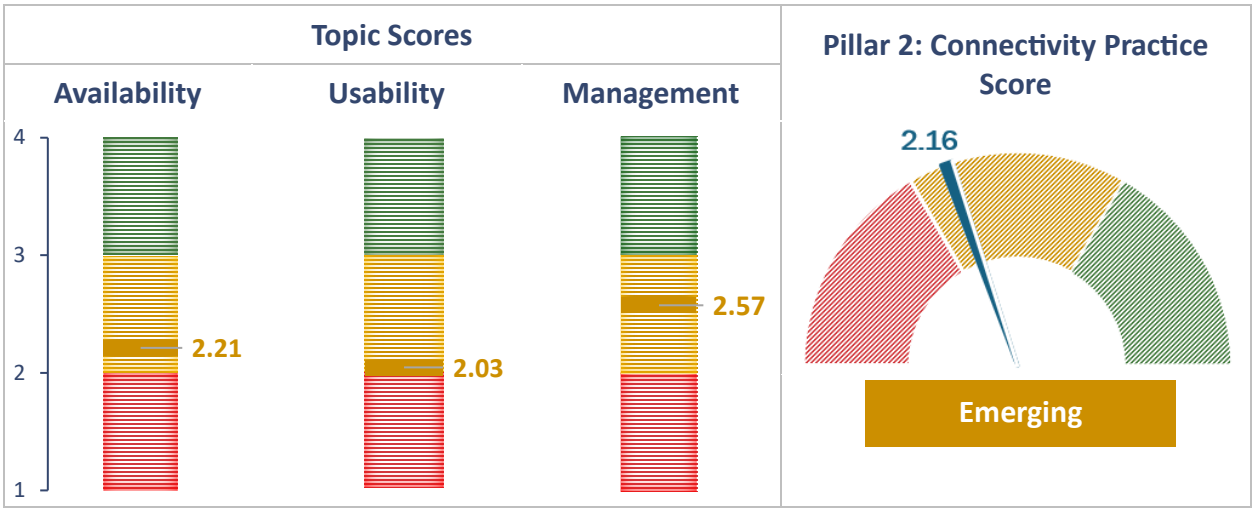
Figure 26 – Internet Management Topic Score



Overall Connectivity Score

Because the Internet is largely available across institutions but used mostly for administrative purposes, the score for the Connectivity pillar is at the low end of the "Emerging Level" (See Figure 27)**.** Almost 90 percent of TVET institutions in Zambia report having access to the Internet, the majority using a broadband connection that is reliable and has a decent speed. Internet service is likely uninterrupted in two-thirds of training institutions that report no challenges in covering their monthly payments. But institutional Internet access does not always guarantee access to online content for educational purposes. While admin devices have internet access in almost 80 percent of institutions, learners' and instructors' devices are connected in less than half. Added to the limited access to devices for pedagogical purposes, this practice further restricts the effective use of the Internet for teaching and learning.

Figure 27 – Connectivity Practice Scores



Pillar 3 - Instructors

Recruiting and retaining qualified TVET instructors is a growing challenge amid rapid technological change. Demanding skill requirements and limited incentives make the profession less attractive. One challenge stem from underinvestment in TVET, which results in relatively low instructor compensation and a scarcity of modern equipment and facilities. Such working conditions discourage both prospective and current instructors (Muscat, 2023). Another challenge is the expectation that instructors have pedagogical skills, digital competences, and up-to-date industry experience —a combination that sets a high entry bar and narrows the pool of qualified candidates. Individuals with these qualifications are often recruited by companies offering more competitive work arrangements (OECD, 2021). These factors reduce the attractiveness of the profession and have contributed to an aging instructor workforce: in 2021, 45 percent of TVET instructors across 25 OECD countries were at least 50 years old, up from 41 percent in 2013 (OECD, 2023c).

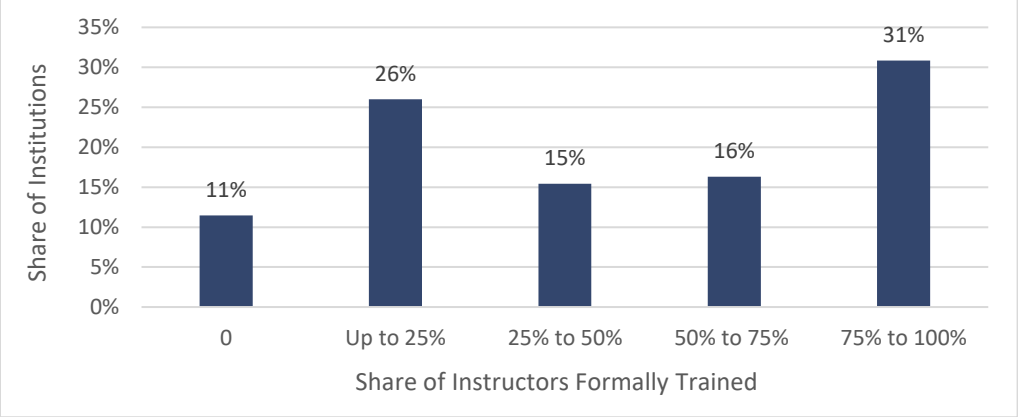
Instructors' ability and motivation to use technology are key to effective ICT integration. Without this, digital tools often go unused, despite investments in connectivity and devices. International experience concurs that distributing equipment alone has limited impact when instructors are unprepared or unwilling to adopt new practices. Many factors can shape instructors' capacity or openness to using ICT in the classroom (UNESCO, 2023), including gaps in pre- and in-service training, limited access to infrastructure or devices, lack of involvement in ICT-related decisions, and insufficient institutional support, often leading to low confidence in using technology to teach. This pillar examines institutional practices for evaluating and enhancing instructors' digital skills, as well as fostering continuous learning and adaptability.

Topic 1: Capacity

In addition to pedagogical and vocational skills, pre-service training should equip future instructors with the digital skills needed to prepare and deliver content using ICT. Measuring this, however, is challenging. Instructor training programs are diverse, digital skills assessments could be costly, and curriculum reviews are time intensive. ETRI-TVET gauges instructors' digital competence through institutional leaders' estimates of the share of instructors professionally trained in digital skills and their confidence in instructors' ability to perform a set of defined tasks.

Institutional leaders in at least half of the TVET institutions estimate[17] that most instructors did not receive formal training in basic digital skills during pre-service education. Estimates fall into two distinct categories. On the lower end, 11 percent of leaders believe that none of their instructors were trained in this area (Figure 28). When combined with other institutions with similarly low estimates, 52 percent of leaders believe that fewer than half of their instructors were formally trained in digital skills. In contrast, 47 percent hold a more optimistic view, estimating that more than half of their instructors are formally trained to teach basic digital skills. Estimates seem to be inversely correlated with institution size and ownership. Larger institutions tend to report lower levels of pre-service training, and this trend is more pronounced in public institutions—where over half estimate that fewer than 25 percent of instructors received such training—compared to 32 percent in private institutions.

Figure 28 – Share of Instructors Formally Trained to Teach Digital Skills



Institutional leaders were asked to estimate the ability of instructors teaching ICT-related subjects in the most tech-intensive program to perform tasks such as creating digital presentations, preparing lessons involving ICT use by learners, designing digital assignments

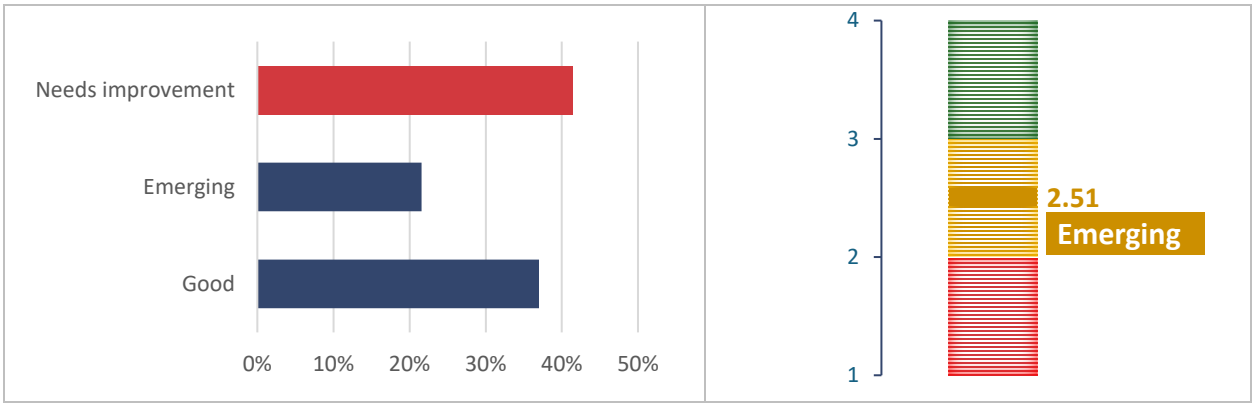
[17] These figures should be interpreted with caution, as institutional leaders may under- or overestimate the actual numbers, potentially overlooking some instructors or the full range of training programs.

and assessments, communicating digitally, and keeping digital records.[18] Most leaders—at least 75 percent— expressed confidence that their most tech-savvy instructors can independently carry out all these tasks. Between 10 and 20 percent were not confident, and 4 to 5 percent did not provide an estimate. While confidence levels were generally high across tasks, they were slightly lower for collaboration with peers online, assessing learners using digital means, and making presentations.

Instructor Capacity Topic Score

A high proportion of instructors without formal pre-service training to teach basic digital skills places this topic at the "Emerging Level" (Figure 29)**.** Instructor capacity was assessed through two estimates: Whether instructors acquired digital skills during their pre-service training, and institutional leaders' perceptions of instructors' digital skills. The first suggests that many instructors likely did not receive such training. The second suggests that the best-performing instructors are well-versed and capable of a wide range of digital tasks. Both measures, however, have limitations. Institutional leaders may not be aware of all instructors' backgrounds or all pre-service training programs, and their assessments may reflect only a few top-performing instructors rather than overall classroom practice. As such, these estimates do not provide a complete picture of digital competency across all instructors.

Figure 29 – Instructor Capacity Topic Score



Topic 2: Standards

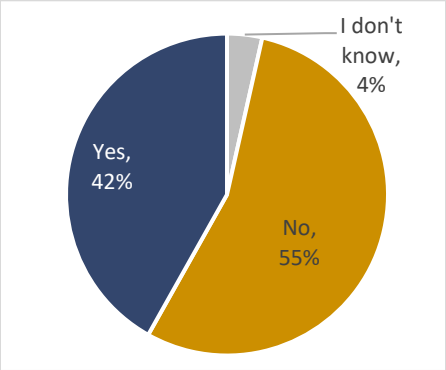
Digital competence standards provide a valuable framework for identifying the skills that instructors need to integrate ICT effectively into teaching. They can guide in-service training design, digital skills assessment, and the selection of professional development opportunities to

[18] ETRI-TVET faced three challenges in measuring instructors' digital skills. First, direct testing was not conducted, so estimates were used. Second, estimates are imprecise, though still informative. Third, because not all programs or instructors are expected to use ICT, the focus was placed on those teaching in the most tech-intensive programs.

address gaps. Integrating ICT into training involves more than increased device use; it also requires a shift in the instructor's role—from primarily delivering information and supervising practice to assisting learners in interpreting information and solving problems using ICT (Hoong Lee, 2022). Achieving this shift depends on instructors' confidence in their digital skills and their use of effective digital pedagogy. This topic examines whether training institutions use any framework or guideline to define and assess the digital skills of their instructors.

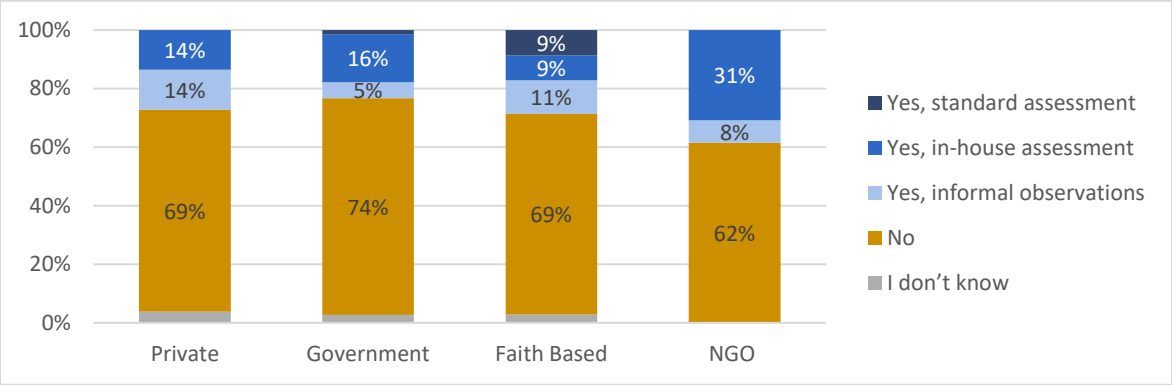
Although a national competency framework exists, more than half of institutions do not use a framework or set of guidelines defining the digital competencies that instructors are expected to have or develop. Limited use is more common in public institutions (62 percent) than in private ones (50 percent) and is particularly high in the Northwestern (80 percent), Western (71 percent), and Eastern (62 percent) provinces. Still 42 percent of institutions report using digital competency standards, indicating that resources are available but not yet widely applied. Familiarity with such frameworks is higher in the Central and Luapula provinces, as well as in Grade 1 institutions (See Figure 30).

Figure 30 – Institutions with a Digital Skills Framework for Instructors



Around 70 percent of institutions have not evaluated instructors' digital competencies in the 12 months prior to the survey. This was more common in public institutions (74 percent) than in private (69 percent), faith-based (69 percent), or NGO-run institutions (62 percent). Among those that had conducted evaluations, most relied on in-house formal assessments (15 percent) or informal methods such as observations and student feedback (11 percent). These approaches suggest that institutional leaders' estimates of instructors' digital skills are often based on limited or subjective information, leaving little basis for the institution to define the necessary support or professional development needed to make the integration of ICT into teaching and learning possible. Only 2 percent of institutions reported using formal standardized assessments aligned with a digital skills framework, most of which were faith-based institutions in Lusaka, Copperbelt, and Southern provinces (Figure 31).

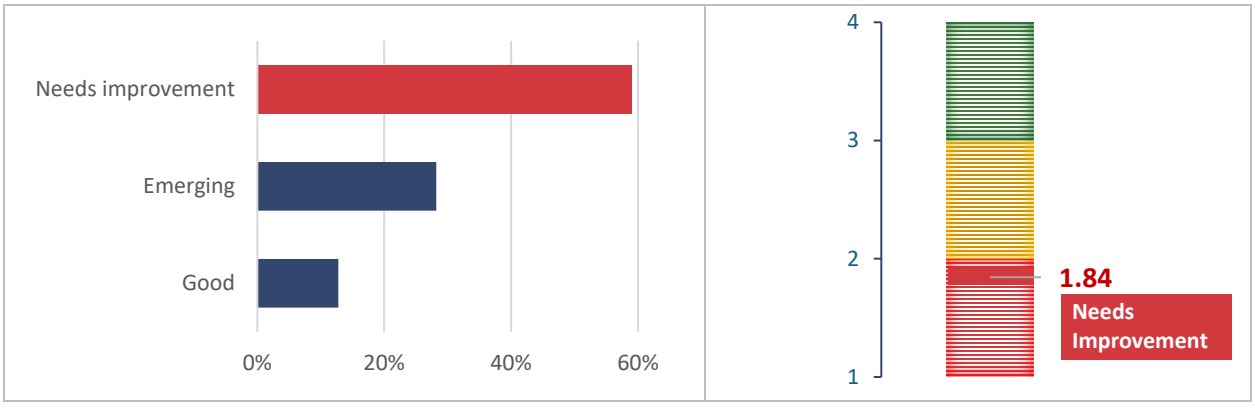
Figure 31 – Evaluation of Instructors' Digital Competencies by Institution Type



Instructor Digital Skills Standards Topic Score

The limited use of a digital competency framework and lack of skill assessments place most institutions, and this topic, at the "Needs Improvement" level (Figure 32). Although a national framework exists, a significant share of institutions is unfamiliar with it. Such frameworks are essential for building a shared understanding of the digital skills required to effectively use ICT in teaching, shaping instructor profiles, designing professional development plans, and identifying skills gaps. Even in the absence of such a framework, assessing instructors' digital competencies remains important in supporting ICT integration. However, more than two-thirds of institutions have not evaluated instructors' digital competencies within the 12 months preceding the survey. While some may have done so earlier, the low incidence of even informal observations suggests this is not a common practice. Without regular assessment, institutional support for instructors is likely to be supply-driven instead of aligned with their actual needs.

Figure 32 – Instructor Digital Skills Standards Topic Score

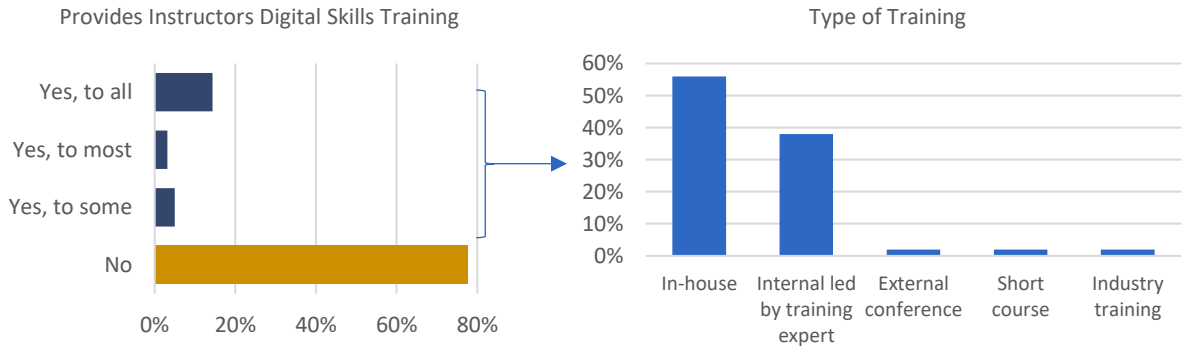


Topic 3: Support and Professional Development

Instructors need institutional support to transform their teaching using digital tools, both through targeted training and ongoing guidance. This topic explores the extent, type, and scope of support provided to instructors, as well as institutional leaders' beliefs about their role in facilitating digital integration. Digital skills training opportunities are essential—particularly when tailored to varying skill levels, interests, and occupational needs. However, support must also go beyond training. Instructors benefit from opportunities to apply their skills, including time for practice and exploration, advice from leadership, and access to technical support or guidance teams. This topic also examines whether institutions provide structured support for instructors to explore, evaluate, and effectively integrate digital technologies into their day-to-day practice.

Although most institutional leaders believe that instructors should use ICT in the classroom, and that institutions have a role in supporting this, few provide the necessary professional development to make it happen. While 93 percent of leaders agree instructors should be well-versed in basic digital skills, and 86 percent believe the institution is responsible for ensuring ICT use in teaching, actual support is limited. As shown in Figure 33, 78 percent of institutions did not offer any professional development training on ICT for teaching and learning in the 12 months prior to the survey[19]. Among those that did offer training, most relied on in-house sessions led by peers or mentors (56 percent) or internal training with external experts (38 percent). These institutions are often Grade One, employ more instructors, and offer higher-level training programs.

Figure 33 – Type of Instructor Training on Digital Skills



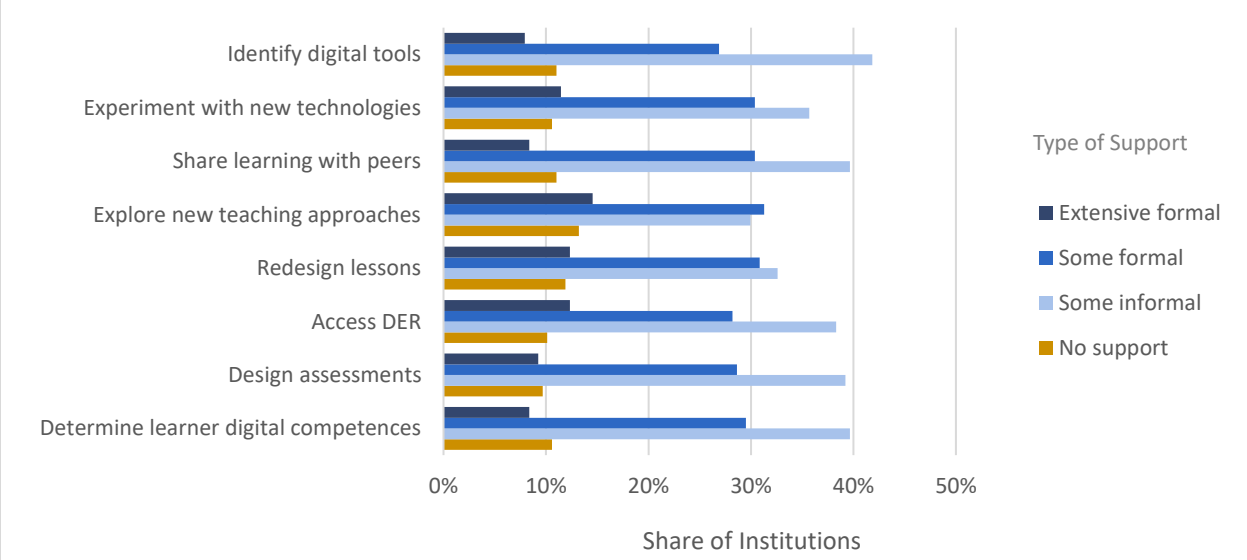
Support for instructors to integrate ICT into teaching tends to be reactive rather than systematic. Institutional leaders were asked to estimate the extent to which institutions provided support or guidance to instructors to perform the following tasks: determine the digital skills to

[19] The proportion is higher among NGOs (85 percent), and institutions in the Eastern (89 percent), Northern (100 percent), and Muchinga (100 percent) provinces.

be developed among learners, design digital skills assessments, access digital learning materials, redesign lesson and course plans to incorporate ICT, explore new approaches to teaching using digital tools, exchange successful practices with peers, experiment with new methodologies and technologies, and identify digital tools that best suit their needs and educational expectations.

Institutional support for ICT integration is mostly informal, with instructors typically seeking guidance from management on an as-needed basis (Figure 34). Institutions appear to provide relatively more formal support for instructors to explore new teaching approaches and redesign lessons: one-third of institutions report allocating time for instructors to do these two tasks, and 15 and 12 percent, respectively, have units devoted to providing formal support in these areas. Private and public institutions appear to offer more support than faith-based and NGOs. For example, whereas 44 percent of private institutions and 38 percent of public ones report allocating time for instructors to explore new pedagogical approaches, only 18 percent of NGOs and 15 percent of faith-based institutions do so. Similarly, while 47 percent of private institutions and 30 percent of public ones report allocating time for instructors to redesign lessons and course plans to incorporate ICT, only 21 percent of faith-based institutions and 18 percent of NGOs do so.

Figure 34 – Institutional Support for Instructors to Integrate ICT into Teaching

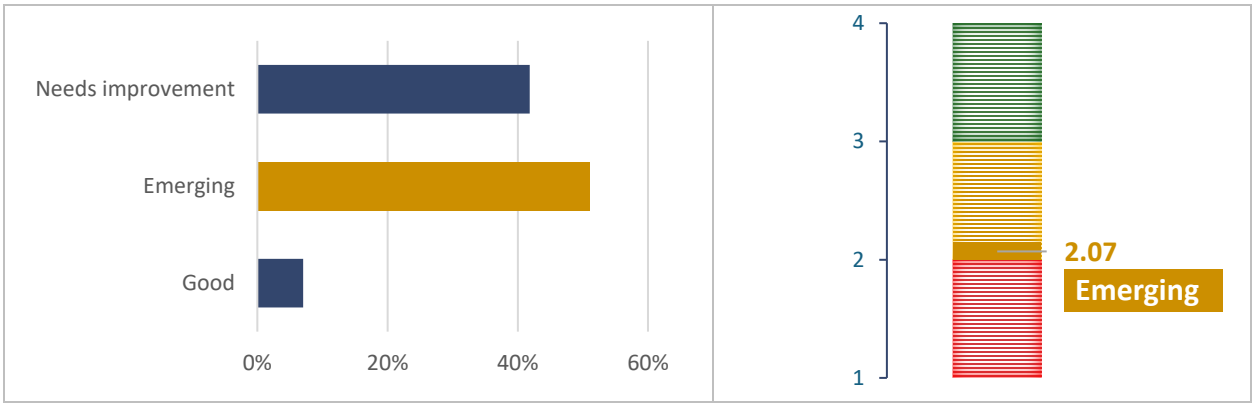


Instructor Support and Professional Development Scores

Limited training and support for instructors to integrate digital technologies into teaching, places the *instructor-support topic* at the low end of the "Emerging" level (See Figure 35)**.** While most respondents agree that instructors should use ICT in the classroom and that all staff should be well-versed in basic digital skills, institutional efforts to build these skills remain limited. Over three-quarters of institutions do not offer professional development opportunities on using ICT

for teaching and learning. Among those that do, most rely on peer-led sessions. A smaller share engages external experts to lead training sessions. Beyond training, institutional support is largely reactive, instructors may request help from management when needed.

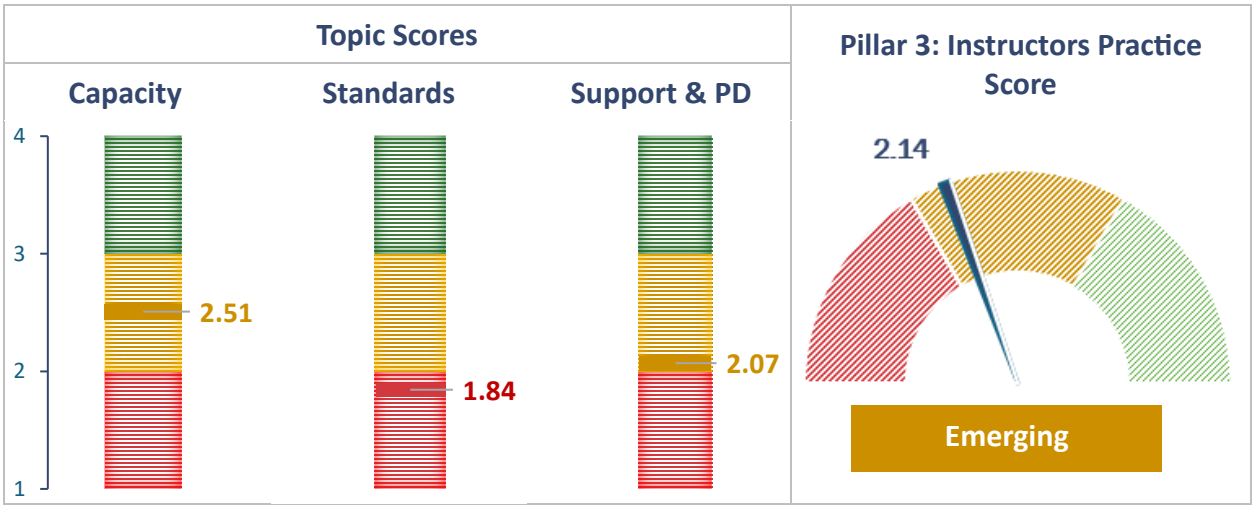
Figure 35 – Instructor Support and Professional Development Topic Score



Overall Instructors Score

The score for the Instructors Pillar is at the low end of the "Emerging Level" due to limited institutional support for integrating digital technologies into teaching (See Figure 36). With many instructors estimated to have received little or no pre-service training in digital skills, in-service training becomes critical—not only for enabling ICT integration into teaching but also for preparing instructors to teach basic digital skills to learners. Without such opportunities, instructors are unlikely to build the confidence and competencies needed to adopt new pedagogical practices. In this context, formal support for digital exploration and self-paced learning becomes even more important. However, most TVET instructors currently receive limited or no such support.

Figure 36 - Instructors Practice Scores



V. Recommendations

The ETRI-TVET assessment reveals that while the Zambian Government has taken important steps to support the integration of education technology—particularly through expanding internet access in public institutions and developing a digital competencies framework for teachers—key policy areas remain constrained. Device-related policies are often general and lack enforcement mechanisms, and limited support exists to help institutions finance or maintain digital infrastructure. Similarly, while internet connectivity has improved, there are no formal standards or monitoring systems to ensure equitable and reliable access across all institutions. Support for developing instructors' digital competencies is also limited, with few opportunities for in-service training or mechanisms to facilitate their participation. These results point to important opportunities for the Government to strengthen implementation, deepen support to institutions, and scale targeted investments that promote effective and inclusive EdTech integration.

At the institutional level, several foundational gaps also persist. More than half of TVET institutions report unreliable electricity access, which continues to hinder the consistent use of digital tools in teaching and learning. While most institutions report having computing devices, their use remains limited, often constrained by high student-to-device ratios and controlled access to computing rooms. Although internet connectivity is available in nearly 90 percent of institutions, access is often limited to administrative devices, with far fewer instructors and learners able to connect for pedagogical purposes. Instructor capacity to integrate digital tools into instruction is also constrained by the lack of structured support, both in terms of training and ongoing development. These findings reveal critical areas where further investment, training, and infrastructure support could unlock the full potential of EdTech in Zambia's TVET sector.

In line with these findings, the results of this assessment provide a valuable baseline for the Government of Zambia to inform and prioritize future investments, strengthen institutional capacity, and guide policy actions to advance digital transformation across the TVET system. Accordingly, this report outlines a set of recommendations based on the results, which can help support the development of a roadmap for improved and sustainable EdTech integration.

1. Electricity: A prerequisite for meaningful EdTech integration

- Reliable electricity is a foundational enabler for any EdTech initiative. Without consistent power, even the most well-designed digital tools and infrastructure remain underutilized. Thus, it is important that the Government continues to advance solutions to improve both access to and reliability of electricity supply across TVET institutions. This may include expanding grid infrastructure, promoting decentralized

renewable energy solutions such as solar systems and mini-grids[20], and implementing energy efficiency measures, such as the use of energy-saving equipment and improved maintenance practices, to ensure sustainable and uninterrupted power for digital learning environments.

2. Digital Development Partnerships to build infrastructure and expand access

- Partnerships that bring together governments, donors, multilateral organizations, the private sector, and civil society can help accelerate the digital transformation of the TVET sector by expanding access to services and offering technical expertise, financing, and knowledge exchange to align digital investments with education priorities. These partnerships can support efforts to connect institutions to reliable internet, provide appropriate digital tools, develop national platforms for learning and administration, promote digital pedagogy through instructor training, and strengthen data systems to monitor EdTech implementation. Importantly, such partnerships help avoid duplication, improve coordination, and help ensure that digital investments are better aligned and more likely to contribute to improved and equitable outcomes.
- Examples of potential partnerships to consider include exploring collaboration between ZICTA, ICT or tech companies, and financial institutions—possibly backed by government guarantees—to expand current connectivity programs and extend access to a broader set of training institutions, including private providers. In addition, partnerships with private sector actors and banks could be explored to support access to digital devices for students and instructors. In some cases, temporary import duty exemptions might be considered to enable key suppliers to offer devices at more affordable prices.

3. Device and Connectivity: Foundations for Digital Learning

- **Partnerships for devices:** The partnerships previously discussed could be leveraged to mobilize support for financing the acquisition and maintenance of digital devices in training institutions. Collaborating with private companies to support both initial purchases and ongoing maintenance can help ensure greater sustainability and extend the long-term durability of the equipment, while complementing government efforts. In parallel, partnerships can also play a key role in providing technical support—whether through phone-based assistance, online services, or in-person visits—to ensure equipment remains functional and up to date.

[20] Also called microgrids, are small-scale electricity generation and distribution systems that operate independently from the national grid or can be connected to it.

- **Partnerships for connectivity:** Additionally, such partnerships can be explored to expand internet connectivity. For example, strengthening collaboration with entities like Starlink and national telecommunications companies could facilitate access to internet services for students and lecturers, including the provision of zero-rated data packages linked to institutional registration systems.
- **Integration of digital access requirements into institutional registration standards:** Another mechanism to help ensure the quality of devices and connectivity is to integrate digital access requirements into institutional registration standards. This would involve explicitly including minimum specifications for digital devices and internet access in the registration criteria for training institutions, helping to guarantee a baseline level of quality and connectivity across the sector.
- **Reducing Costs:** Explore practical options to reduce the cost at which bandwidth is acquired for the education and training sector—potentially through mechanisms that support organizations like ZAMREN in negotiating more favorable rates. Such efforts could help provide more affordable and sustainable connectivity to subscribing institutions, while also exploring the possibility of expanding access to eligible private training providers to support broader digital inclusion.
- **Access to Technical Support:** It is essential that each institution with technological equipment has dedicated technical staff on-site to consistently maintain, update, and protect the equipment. Without such support, it is not feasible to ensure the proper functioning of the equipment or to assist personnel in effectively using it for teaching and learning.

4. Empowering Instructors Through Training and Guidance

- **Device + Training Package:** If the government aims for instructors to become proficient users of digital tools, access to personal or institutional computing devices is essential. Even with strong training programs in place, without regular access to devices, instructors will not be able to practice or apply what they learn—limiting their ability to build and sustain digital skills over time. For this reason, device access and training should be considered as an integrated package when designing support programs for instructors.
- **Beyond the Framework: Turning Competencies into Action.** The existence of a digital competency framework for teachers in the country represents an important first step in defining the digital skills needed for meaningful EdTech integration in the classroom. However, further action is required to ensure its practical use. These frameworks—often broad or generic—must be translated into concrete training modules that include relatable, subject-specific examples to support application in real teaching

contexts. Additionally, clear illustrations of what skill progression looks like at different proficiency levels would help guide both instructors and training providers.

- **Assessing to Advance: A Serious Approach to Digital Skills.** A serious and sustained approach to developing teachers' digital skills should also be accompanied by competency-based assessments, which can reinforce training needs, identify skill gaps, and enable more efficient targeting of resources and support.
- **Ongoing Training to Keep Pace with Technological Change:** The rapid evolution of technology calls for continuous professional development to ensure that teachers remain up to date—not only with new tools and software, but also with emerging pedagogical approaches. Digital skills frameworks often highlight methods such as student-centered learning, which require both technical proficiency and pedagogical adaptation (Chinen, 2025). To stay aligned with these evolving expectations, ongoing training is essential for enabling teachers to integrate technology meaningfully into their practice.

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Annex A: Characteristics of the Institutional Sample

Figure A1. Institutions by Highest Level of Training Provided

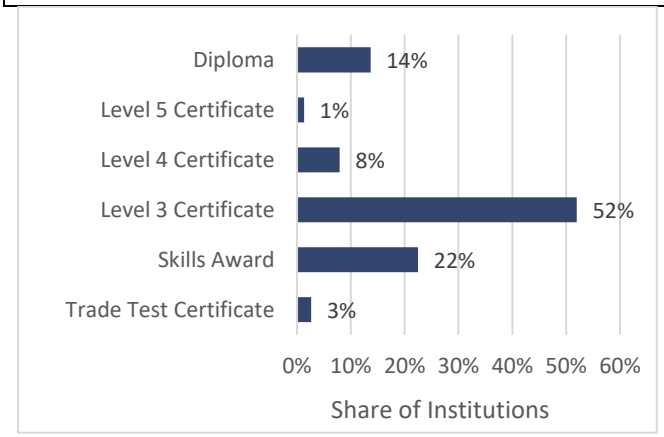


Figure A2. Institutions by TEVETA Grade Level, Based on 8 Quality Standards

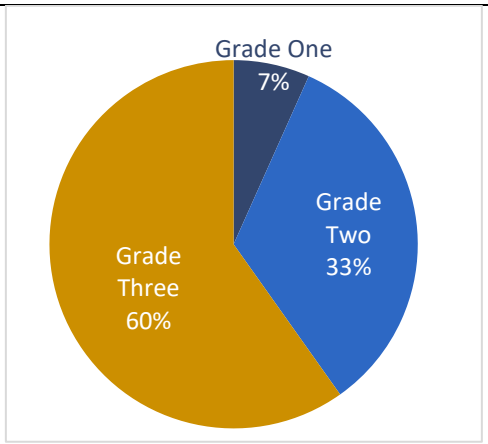
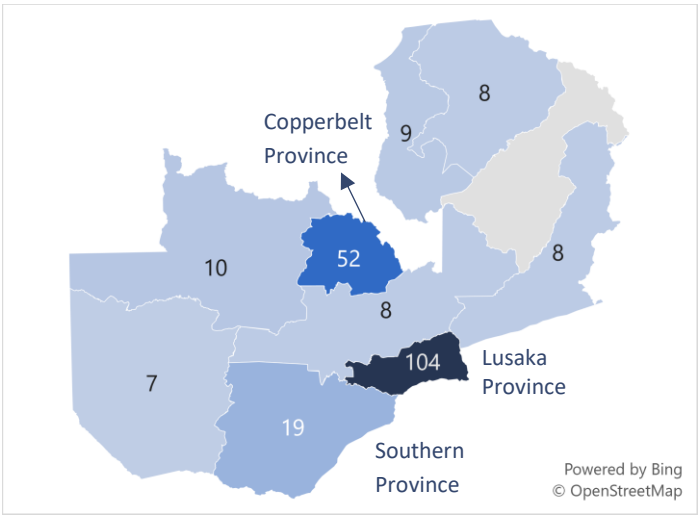


Figure A3. Number of TVET Institutions by Geographic Location



Annex B. Institutions Interviewed for Policy Questionnaire

Ashca Institute
Cabinet Office: E-Government Division (2)
European Union
Evelyn Hone College, Lusaka
Examination Council of Zambia
Germany Development Cooperation
Higher Education Authority
Information and Communication Technology Association of Zambia
International Labour Organisation
Lusaka Business and Technical College
Lusaka Vocational Training Centre
Ministry of Education (3)
Ministry of Finance and National Planning
Ministry of Labour and Social Security
Ministry of Technology and Science (2)
Ministry of Youth, Sport & Arts
National Assembly of Zambia
Nuvian Institute
Phoenix Research Institute
Technical Education, Vocational, and Entrepreneurship Training Authority (2)
Thorn Park Construction Training Centre
University of Zambia, Lusaka
Zambia Association for the Disabled (ZAPD)
Zambia Bureau of Standards
Zambia Congress for Catholic Bishops
Zambia Federation of Employers
Zambia Qualifications Authority
Zambia Research and Education Network (ZAMREN) – Provider of internet services for TVET institutions
Zambia Information and Communications Technology Authority

Annex C. The Technical, Vocational and Entrepreneurship Training Authority

The Technical, Vocational and Entrepreneurship Training Authority (TEVETA) plays a central role in operationalizing digital skills policies through the following functions:

- **Defining digital competencies for learners**: TEVETA sets occupational standards that specify the digital skills required for certification in accredited programs.
- **Introducing digital skills curricula**: TEVETA develops curricula and defines the digital competencies learners must acquire, mandating the inclusion of at least a basic computer skills module in all programs.
- **Enforcing standards for Internet and device access:** TEVETA requires all institutions to maintain a computer lab with one computer per learner at any time, as per the *Minimum Training Standards Guide*. It conducts inspections focused on the presence of internet and computers, though not the quality or usage.
- **Aligning with labor market needs**: TEVETA coordinates the development of National Occupational Standards (NOS) through consultations with industry groups such as the Zambia Federation of Employers (ZFE), the Zambia Chamber of Commerce and Industry (ZACCI), the Zambia Association of Manufacturers (ZAM), and leading academic institutions such as the University of Zambia (UNZA) to ensure curricula reflect evolving digital skill demands.