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International Telecommunication Union
Development Sector

Exploring sustainable connectivity and digital skills models for youth not in employment, education or training (YNEETs) in rural and township communities

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In partnership with:

Acknowledgements

This report was developed by the International Telecommunication Union (ITU), with the support of the ITU Area Office for Southern Africa.

ITU would like to thank the South African Department of Communications and Digital Technologies (DCDT) for their collaboration, support and significant input and comments throughout the drafting of this baseline study, the Managers of the Digital Access and Skills Centres (DASC) for their extensive contributions, as well as the Department of Social Development and the Department of Economic Development in the Northern Cape for assistance with the development of the DASC database.

This baseline study was undertaken by Prof. Shafika Isaacs and team and has incorporated feedback and comments from DASC and youth who participated in focus group discussions.

The report was produced under the framework of ITU work on promoting effective regulation, greater investment and innovative models for school connectivity in underserved communities and for broader digital inclusion supported by the United Kingdom Foreign, Commonwealth and Development Office (FCDO).

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ISBN

978-92-61-39801-9 (Electronic version)
978-92-61-39811-8 (EPUB version)

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Foreword

In today's digital era, access to meaningful connectivity and digital skills is not merely a luxury but a fundamental enabler of economic and social inclusion.

South Africa faces a pressing challenge – an increasing number of youth not in employment, education, or training. To bridge this gap, innovative and sustainable models for connectivity and skills development need to be prioritized to ensure that vulnerable and marginalized youth can participate meaningfully in the digital economy. The Sustainable Connectivity and Skills Models for South Africa report is a vital contribution to ongoing efforts to address digital exclusion. It focuses on the role that digital access and skill centres play in equipping those in need with the digital skills necessary to thrive in the modern workforce, these centres are hubs for learning and economic empowerment.

The report also assesses the current models being utilized by these centres to achieve sustainability and highlights their important role as key enablers of digital inclusion, providing Internet access, training and pathways to employment. These centres have expanded opportunities for youth, yet to reflect job market demands and improve financial sustainability, ensuring public private partnerships together with innovate financing and community engagements are crucial to a long-term impact. Young people with relevant digital skills will foster a more inclusive, resilient, and prosperous society.

This report serves as a call to action to harness the power of connectivity and skills development to unlock the potential of South Africa's youth, ensuring they are not left behind in the digital revolution. Through sustainable interventions, lives will be transformed, communities strengthened, to drive meaningful socio-economic progress.

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Abbreviations

4IR	Fourth Industrial Revolution
AI	Artificial intelligence
DASC	Digital access and skills centre
DCDT	Department of Communications and Digital Technologies, South Africa
FCDO	United Kingdom Foreign, Commonwealth and Development Office
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
ICDL	International computer driving licence
ICT	Information and communication technology
ILO	International Labour Organization
NEET	Not in employment, education or training
NEMISA	National Electronic Media Institute of South Africa
UNDP	United Nations Development Programme
UNISA	University of South Africa
YNEET	Youth not in employment, education or training
ZAR	South African rand

1 Executive summary

This document reports on the findings of an exploratory baseline research project on sustainable connectivity and digital skills models aimed at broadening digital access and skills opportunities for youth not in employment, education or training (YNEETs) in rural and township communities in South Africa. It responds to the National Digital and Future Skills Strategy South Africa (2021–2025) and the Digital Skills for Decent Jobs for Youth: Young People Not in Employment, Education or Training (YNEET project) launched in 2020 to enable and facilitate their access to learning and decent employment opportunities by strengthening the effectiveness of the digital skills development and labour market ecosystem.

1.1 Key findings

1.1.1 Operating models

The baseline study found that the digital access and skills centres (DASCs) making up the sample had a range of operating models, from for-profit microenterprises (e.g. Vexospark Digital College) to community-owned and -led non-profit companies (e.g. Zenzeleni Community Networks), each with its own governance, management and administrative structures. Some centres were operational units based at public universities (e.g. the NEMISA CoLabs) or served as the non-profit arms of for-profit companies as part of sustainability strategies (e.g. Lindamahle Innovation Centre).

The governance structure of the non-profits included a board of directors comprising between three and six independent members. In the private sector, a few of the DASCs in the sample were registered as private companies and operated mainly as small and microenterprises.

All 21 centre managers interviewed took on duties beyond the management of their centres. All were social pioneers and digital champions who secured funding and mobilized resources; developed networks, social capital and partnerships; recruited youth and community members to participate in various programmes; and designed training programmes.

1.1.2 Digital skills and capacity-building services

The study also revealed that the DASCs offered community members, including youth (who are not exclusively YNEETs) a wide range of digital skills services and related capacity-building and wrap-around support services.

All the interviewees indicated that their centres served communities "of all ages", even though most of the users were young people and not necessarily NEETs; sizeable numbers were unemployed youth but many were students from nearby schools.

A defining feature of the DASCs was a culture of care and support, as observed at the centres where site visits took place. The lead champions played an obvious support role to ensure that participating youth had eaten a meal and that, in the case of women, they had the basic necessities (e.g. sanitary towels) to participate meaningfully in training programmes.

Responsiveness to YNEETs: In the youth focus group discussions, all the young people acknowledged the supportive role that the DASCs had played in their lives, developing their skills and expanding their opportunities and horizons. Several participants had already found

employment; others were unemployed but still studying. The discussions also revealed the creativity and resilience of some of the young people, who had found ways to raise money so that they could participate in the skills programmes offered. Some young people also highlighted the challenges that they faced in securing employment or income-generating opportunities after the digital skills training and recommended that the centres offer programmes that prepared them more in practical terms for the world of work and business.

Youth responses to digital skills programmes: All 40 young people who participated in the four focus group discussions expressed gratitude for the opportunity to learn digital skills. The programmes have had a profound effect on young people, many of whom had started with few or no digital skills.

The interviews with DASC managers also revealed that the young people who had completed digital skills programmes expressed frustration at the disconnect between the certificates and qualifications obtained from accredited programmes and the job opportunities available to them. They expressed an interest in developing "practical" employability skills linked to employment support services.

Many of the DASC managers said that they needed to diversify their service offering beyond the provision of digital skills programmes to include wrap-around support programmes that addressed a broad array of youth vulnerabilities.

It was evident that several DASC managers were not aware of existing strategies and initiatives related to employability skills development and ecosystem linkages with pathways to livelihoods.

The study also found that much of the conversation framed young people as passive recipients of digital skills programmes that were not always designed with or by them in ways that acknowledged their individual and collective agency.

1.1.3 Technology models

The DASCs in the study sample offered public access to Internet connectivity for community members, most of whom were youth. Almost none of the DASCs in the sample were licensed ISPs, the exception being Zenzeleni Community Networks.

In terms of technology infrastructure, all the DASCs were housed in stable buildings equipped with power outlets but have had to manage load-shedding schedules. One of the questionnaire respondents said that they had generators to manage load shedding, and one of the interviewees, the Scatec Centre in the Northern Cape, had solar panels because it had been set up by an independent power producer.

The DASCs also operated on a bring-your-own-device model, whereby youth users brought their own mobile phones, usually smartphones, whether individually owned or shared.

In terms of connectivity infrastructure and access, the DASCs in the sample used models ranging from dial-up and Ethernet to mobile phone hotspots and wireless broadband.

Six out of 13 questionnaire respondents believed that their connectivity access offering could be sustained over a long period of time, while another six believed that they could not sustain connectivity access. It appears from the questionnaire and interview responses that the provision of sustainable connectivity by most of the centres was more aspirational than actual, and some

had proposed strategies that could reinforce funding dependency instead of sustainability for meaningful connectivity.

The interviews revealed two cases of innovative connectivity access models. The first involved the use of TV White Spaces at the Moses Kotane Institute Ixopo Centre in KwaZulu-Natal. TV White Space utilizes unused portions of spectrum in the frequency bands allocated for broadcast television. It is an alternative means of offering affordable and reliable wireless connectivity to underserved communities. The second case is a well-known pioneering example of one of South Africa's first community-based ISPs: Zenzeleni Community Networks in rural Eastern Cape.

1.1.4 Cost models

Interviews with 21 centre managers revealed that they did not have a complete picture of all initial capital and variable costs or hidden unanticipated costs. At the stakeholder forum, centre managers expressed interest in the concept of a total-cost-of-ownership model, with a view to clarifying total costs and thus the resources needed to cover them over time. Table 7 contains a straw-dog proposal for a total-cost-of-ownership model based on the estimated costs of three DASCs. The expanded model considers all possible costs, including the hidden costs of care and support.

1.1.5 Funding models

While most centres were found to be funding dependent, they also explored strategies to reduce their dependency on single donors and diversify their funding models, by charging for some services, albeit minimally; exploring cost-sharing opportunities; and engaging with community and traditional leaders in a position to convene and mobilize communities in support of the centre activities.

Two centres nevertheless indicated that they were sustainable in terms of funding: the Zenzeleni Community Networks and the Scatec Centre in the Northern Cape. The latter's sustainability was linked to its association with a for-profit independent power producer that funds the non-profit.

Subscription models: Of the DASCs in the baseline sample, the Zenzeleni Community Networks operated as an ISP with a subscription model. The rest offered Internet access either at no cost to the user or charged a monthly membership fee for access and training services at the hub/centre.

Willingness to pay, affordability and the DASC user base: When asked whether they charged YNEETs to access their services, 10 of the 13 questionnaire respondents said that they did not charge for services and three that they did charge. The participants in the youth focus group discussions and the centre managers interviewed had mixed views about the willingness to pay for services offered by the centres; some were open to having the centres explore the possibility of charging for certain services provided to young people, but many expressed concern about being asked to pay for services when they were under severe financial constraint.

Some of the centres had very low annual user numbers. For instance, 60 to 100 users per annum would amount to between five and eight users per month on average, compared to the highest number of annual users indicated (11 231). When asked about the profile of DASC users, the questionnaire respondents described a widely segmented user base and four interviewees said, "We service community members of all ages."

1.1.6 Lessons

The study found many lessons. The most salient across all the DASCs were as follows:

- Lead champions tended to burn out and leave unless they had built a leadership cadre able to replace them and ensure capacity and continuity.
- The various DASCs were unfamiliar with one another, which meant that they lost the opportunity to share experiences and negotiate collectively on shared interests.
- There was a lack of awareness of innovative connectivity models.
- There was no platform for sharing knowledge among DASCs.
- The centre founding leaders had established a culture and ethics of care that could be cultivated further.
- The centres could offer a wide array of services beyond digital connectivity access and skills development, to help young people develop income-generating skills.
- Investment in asset-based approaches to the development of youth agency was of great value.

1.2 Small wins and policy recommendations

The study recommends that the DASCs engage in the following small-wins strategies:

- explore alternative models of sustainability by developing their social and cultural capital as a means of mobilizing financial capital;
- explore various development financing avenues;
- consider sharing infrastructure with established government and private sector entities, similar to what national research and education networks do with clinics and libraries;
- partner with higher education institutions.

DCDT and ITU, for their part, are encouraged to consider:

- mapping all DASCs across South Africa, to gain insight into ways to support underserved communities linked to existing mapping systems developed by DCDT and partners;
- establishing a DASC community of practice or collaborative knowledge network of centres that share common interests and experiences that can be exchanged at annual or biannual virtual meetings;
- building bridges between centres and employer associations.

The study also recommends that Phase Two of the South Africa Connect Policy include the DASCs in its community centre roll-out plans and that it consider the technical, finance and cost model findings of the study.

2 Introduction

This report provides an analysis of an explorative baseline research project on sustainable connectivity and digital skills models aimed at broadening digital access and skills opportunities for YNEETs in rural and township communities in South Africa.

The research project is an initiative by ITU-FCDO in collaboration with DCDT. Specifically linked to the joint project Digital Skills for Decent Jobs for Youth: Young People Not in Employment, Education or Training (YNEET project) initiated in South Africa in 2020. The joint project aims to contribute to the National Digital and Future Skills Strategy South Africa (2021–2025)[1] and to respond to the needs of YNEETs in ways that enable and facilitate their access to learning and decent employment opportunities by strengthening the effectiveness of the digital skills development and labour market ecosystem. .

3 Background, context, and concepts

South Africa is situated at the southern tip of the African continent and has a surface area of 1 219 602 sq.km. Table 1 provides an overview of the country's economic and human development indicators.

Table 1: South Africa: Overview of economic and human development indicators

Indicator	Measurement
Population (2022)	61 384 000
No. of households (2022)	18 477 000
Population by gender* (2021)	51.3% female; 48.7% male
Percentage rural population (2022)	31.4%
Human Development Index ranking (2019)	0.709 (114th of 189 countries)
Gross National Income per capita (2017)	USD 12 129

* Gender data currently limited to male or female.

Sources: Statistics South Africa, Mbalo Brief. Census 2022 Results, 2023; UNDP, South Africa National Human Development Report 2022. Harnessing the Employability of South Africa's Youth, 2019.

3.1 YNEETs: Status and concept

In South Africa, youth are defined as persons aged 15 to 34, whereas in the United Nations system they are defined as persons aged 15 to 24. While this study applies the South African age range, most available research is confined to the 15-to-24-year range.

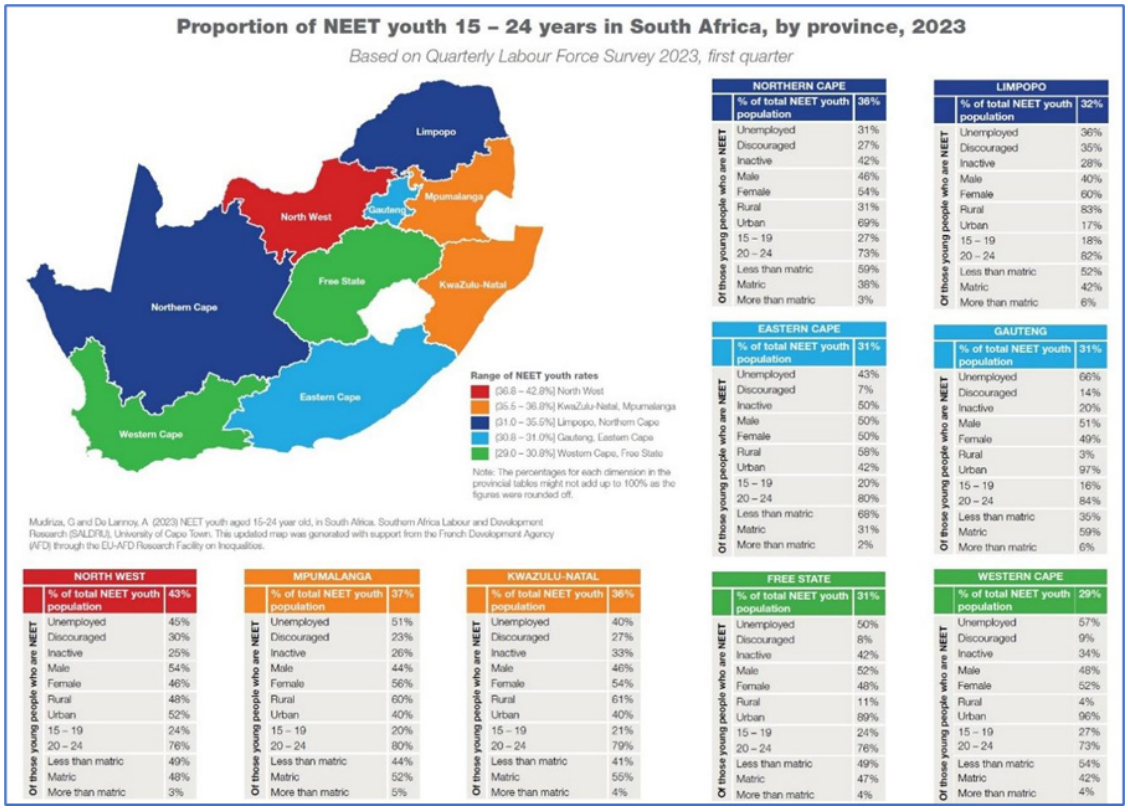
This study focuses on youth labelled as not in education, employment or training (NEETs or YNEETs), while acknowledging that the discourse on NEETs and YNEETs also raises questions

[1] Available at the Government of South Africa website.

about framing the relevant issues in terms of a deficit or "othering"[2]. South African policy-makers and practitioners refer to two categories of NEETs: inactive NEETs and those actively seeking employment.[3] Inactive NEETs are persons who are not in employment, education or training and not looking for work or any form of income-generating activity. There are many reasons for the prevalence of inactive NEETs in South Africa, many of which are linked to the structural and systemic nature of unemployment and precarity in the country's economy[4]. Figure 1 contains a map indicating the proportion of the population in each of South Africa's nine provinces classified as NEETs in 2023.

The estimated figure of 3.5 million young people aged 15 to 24 (not the expanded age range of 15 to 34 years) classified as NEETs in South Africa in 2022 dropped slightly to 3.4 million in 2023. The proportion of NEETs relative to the total youth population, known as the NEET rate, was 34.3 per cent in 2022 and dropped slightly to 33.3 per cent in 2023. In 2023, 1.4 million (41 per cent) of the 3.4 million NEETs resided in rural areas.[5]

Figure 1: Proportion of NEET youth in South Africa, by province, 2023



Note: The designations employed and presentation of material in this publication, including maps, do not imply the expression of any opinion whatsoever on the part of ITU concerning the legal status of any country, territory, city or area, or concerning the delimitations of its frontiers or boundaries.

Source: G. Mudiriza and A. De Lannoy

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2 See, for instance, J. Avis, Beyond NEET: Precariousness, Ideology and Social Justice – the 99%, Sage Journals, Vol. 6/1, 2014, and R. Simmons and R. Thomson, Reclaiming the disengaged: critical perspectives on young people not in education, employment or training, Research in Post-Compulsory Education, Vol. 18/1-2, 2013.

3 M. Khuluvhe and E. Netshifhefhe, Fact Sheet on "NEETs" (Persons who are not in employment, education or training), fact sheet, Department of Higher Education and Training, South Africa, 2022.

4 Statistics South Africa, General Household Survey 2021, statistical release, 2022.

5 G. Mudiriza and A. De Lannoy, Profile of young NEETs aged 15-24 years in South Africa: an annual update, Southern Africa Labour and Development Research Unit, June 2023.

Figure 1 shows that each of the five provinces covered in the baseline study (Eastern Cape, Kwazulu-Natal, Limpopo, Northern Cape, North West) had a YNEET rate exceeding 30 per cent in 2023. While noting these findings, the study acknowledges that the concept and measurement of the NEET rate is also subject to debate[6] and uses it as an indication of the condition of many young people in South Africa for pragmatic reasons.

3.2 Digital access status

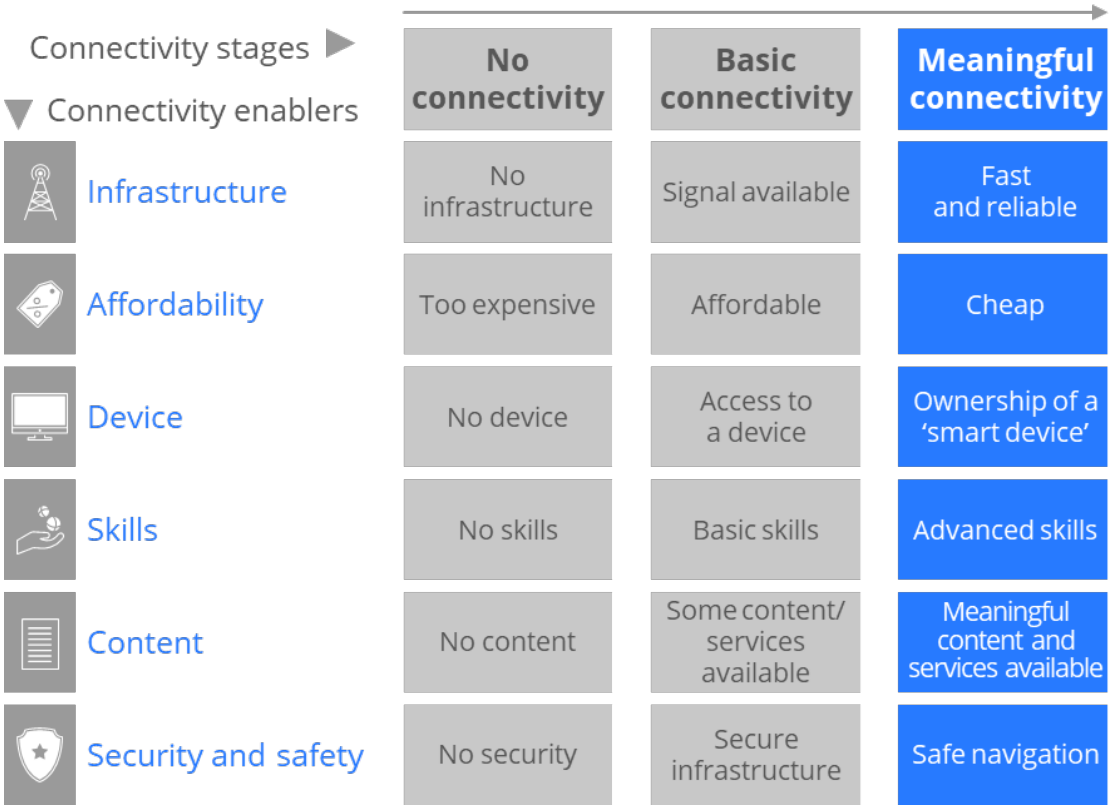
South Africa's digital status is documented in a variety of sources, all of which suggest that digital access has been increasing. It must be borne in mind, however, that those sources are based on narrow technological indicators that focus on physical access only, such as number of mobile connections and Internet users.

This study assesses the digital status of people in South Africa in line with the ITU concept of meaningful connectivity[7]. Meaningful connectivity extends beyond physical access to digital technologies to embrace elements that make Internet connectivity meaningful and valuable for individuals, companies, governments and communities. It focuses attention on requirements for meaningful digital infrastructure access, such as devices, and on a range of factors that enable a safe, satisfying, enriching and productive online experience that is affordable. The critical elements for meaningful connectivity are depicted in Figure 2 and defined in terms of situations of no connectivity, basic connectivity and meaningful connectivity. Thus, meaningful connectivity implies fast and reliable digital infrastructure, smart device ownership, advanced digital skills, meaningful content and services, and safe navigation; it must also be affordable.

6 See S. Elder, What does NEETs mean and why is the concept so easily misinterpreted? ILO Technical Brief No. 1, ILO and Mastercard Foundation, January 2015.

7 See the Universal and meaningful connectivity page on the ITU website.

Figure 2: Levels of connectivity



Source: Meaningful school connectivity report (Giga 2021)

The study also explores how the DASCs currently make meaningful connectivity available and accessible to YNEETs, and how YNEETs use it. It applies the ITU concept of last-mile connectivity,[8] which refers to the location where the Internet reaches end users and includes the local access network (local loop, central office, exchanges, wireless masts, etc.). The access network reaches end-user devices, typically basic and smartphones, laptops, tablets, computers and other Internet-enabled devices. Table 2 provides a snapshot of South Africa's digital status in early 2023 in terms of individual user access. It shows that, at the time, 27.7 per cent of South Africa's population was considered to be offline.

Table 2: Digital status, South Africa, 2023

Indicator	Measurement
Number of Internet users	43.48 million
Internet penetration rate	72.3%
Number of people who did not use the Internet	16.6 million
Percentage of population offline	27.7%
Median mobile Internet connection speed	36.7 Mbit/s

[8] See ITU, The Last-mile Internet Connectivity Solutions Guide: Sustainable connectivity options for unconnected sites, Geneva, 2020.

Table 2: Digital status, South Africa, 2023 (continued)

Indicator	Measurement
Median fixed Internet connection speed	40.12 Mbit/s
Number of cellular mobile connections	112.7 million

Sources: S. Kemp, Digital 2023: Global Overview Report, Datareportal, 26 January 2023; GSMA Intelligence.

According to the 2021 General Household Survey,[9] the proportion of households using only cellular phones for communication increased from 89.4 per cent in 2020 to 90.80 per cent in 2021, while the proportion that had neither landline nor cellular phone access was 2.2 per cent.

In 2021, 69.4 per cent of households accessed the Internet using mobile devices. That figure rose to 73.4 per cent for households located in metropolitan areas and fell to 59.2 per cent for those located in rural areas. Moreover, 17.2 per cent of households in metropolitan areas but only 1.2 per cent of rural households had access to the Internet at home; regarding the provinces covered by this baseline study, less than one per cent of rural households had access to the Internet at home in the Eastern Cape (0.2 per cent), North West (0.3 per cent) and KwaZulu-Natal (0.2 per cent).

Rural areas are generally characterized by lower population densities compared to urban centres. Economic activities tend to focus on subsistence agriculture. Rural areas are also associated with less-developed digital and basic infrastructure (water, electricity) and services (education, health care). They are defined in relation to their proximity to urban areas/centres and are often referred to as "remote" from urban areas. Another feature of rural areas in South Africa is traditional and communal land use, as reflected in the relevant policies.

The figures above point to the distance that South Africa will need to travel to reach universal access to meaningful connectivity amid disparities in access between rural and urban households. The availability of digital services to individuals, including YNEETs, is also dependent on a consistent supply of electricity. Interruptions in the supply of electricity in the form of load shedding have also affected the quality of communication services provided to the public and businesses.

3.2.1 Digital social and economic exclusion

Digital inequality takes many forms and is expressed as digital social and economic exclusion. A survey on digital literacy conducted by NEMISA in 2021 among 3 000 respondents from across South African townships, peri-urban areas and rural regions in all nine provinces, 64.4 per cent of whom were between 15 and 35 years old, found that access to the Internet at home was the strongest factor in the perception of digital social inclusion: 71.2 per cent of respondents in peri-urban areas and 84.2 per cent of respondents in rural areas who did not have access to the Internet perceived themselves as subject to digital and social exclusion. The first language was another strong factor in perceived digital social inclusion: 80 per cent of respondents who spoke IsiXhosa, IsiZulu or Xitsonga and used WhatsApp perceived themselves to be in a state of digital social exclusion. In addition, 43.5 per cent of respondents in rural areas who used the

[9] Statistics South Africa, 2022

Internet to search for business opportunities perceived their status as one of digital economic inclusion, compared to 87.5 per cent of those who did not use the Internet for that purpose.[10]

3.2.2 South Africa's digital skills status

The study acknowledges the existence of wide-ranging definitions of digital skills and draws on the premise that digital skills exist on a spectrum, from basic to more advanced, and encompass a "combination of behaviours, expertise, know-how, work habits, character traits, dispositions and critical understandings"[11], as described below.

Basic digital skills enable engagement with digital technologies at levels that are basic and foundational. They include basic tasks and foundational digital skills such as using a keyboard, operating a touch screen, using basic software and managing privacy settings and basic online operations.

Intermediate digital skills are value-added skills that enable the use of digital technologies in meaningful and beneficial ways, including for the critical evaluation of digital content. Intermediate digital skills are associated with job readiness because they are needed to perform work-related functions such as desk-top publishing and digital marketing. Intermediate skills also take account of technological change and the consequent adaptation of skills.

Advanced digital skills are specialized skills, mainly in technology-related occupations, and include computer programming and network management. They involve both advanced formal education and non-formal training programmes such as bootcamps. Advanced skills are also associated with skills that create technologies that challenge the status quo and enable transformation.

In their survey of digital skills in South Africa, Twinomurinzi et al.[12] came up with the following findings across five categories of digital skills.

1. **Information and data literacy (ability to comprehend digital information)**: 64.8 per cent of respondents could comprehend digital information, which meant that 35.2 per cent were unable to do so. Younger respondents (21–30 years) had higher levels (70.4 per cent) of data literacy than those over 60 (25.3 per cent).
2. **Communication and collaboration (connect and share in a digital environment)**: 76.9 per cent of respondents were aware of the potential impact of their communications on social media, and 70.6 per cent were careful about what they posted.
3. **Digital content creation (create and edit content using digital artefacts)**: The platforms most used for creating content were WhatsApp (86.5 per cent), Facebook (76.3 per cent), YouTube (47.3 per cent), Google+ (41.5 per cent) and Instagram (34.4 per cent). Young people (15–35) accounted for a disproportionate level (78.5 per cent) of Instagram use.
4. **Online safety (protect information, ensure privacy and stay safe in the digital world)**: 31.1 per cent of respondents rarely or never backed up their information and documents; 65.8 per cent said that they protected their information and stayed safe in the digital world; 81.7 per cent were wary about financial risks, such as credit card fraud and identity theft; 75.6 per cent did not feel safe using the Internet in public spaces; 55.2 per cent felt unsafe using the Internet at work; 74.6 per cent felt safe using the Internet at home; 12.6 per cent had been victims of cybercrime or fraud.

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[10] H. Twinomurinzi et al. (eds), Digital Skills in South Africa at the Citizen Level, NEMISA and UNISA,2021.
[11] Working Group on Education: Digital skills for life and work, Broadband Commission for Sustainable Development, ITU and UNESCO, 2017, p. 4.
[12] H. Twinomurinzi et al., Digital Skills in South Africa at the Citizen Level, NEMISA and UNISA, 2021.

5 **Problem solving (identify digital resources to solve and make decisions for problems and opportunities)**: 54.7 per cent of respondents believed that they were able to identify digital resources to help them solve problems and make decisions; 62.4 per cent believed that they adapted easily to technological change.

While studies that measure digital skills levels in ways that are relevant to YNEETs are limited, the available literature confirms the prevalence of structural digital inequality in many forms, including multiple factors related to digital skills and capabilities among youth and YNEETs specifically.

3.3 Digital policy context and strategic digital programmes

Since the early 1990s, South Africa has developed successive national economic development policies, strategies and flagship programmes to improve socio-economic well-being, universal quality access to digital infrastructure and digital skills development. The national development plan adopted in 2012[13] has an overarching vision for the country that includes a "dynamic and connected vibrant information society and a knowledge economy that is more inclusive, equitable and prosperous". It stipulates that by 2030, the Government will be making extensive use of ICT to engage with and provide services to citizens, thanks to an enabling, coordinated and integrated e-strategy that cuts across government departments and sectors. A series of interrelated policies articulates commitments consistent with targets to promote universal quality access to digital infrastructure, meaningful connectivity and digital skills development. Some of the most salient policies are described below.

1 The **South Africa Connect Policy**, which was adopted in 2013, is South Africa's national broadband policy. It aims to provide affordable broadband access to all users at 10 Mbit/s by 2020 and at 100 Mbit/s by 2030. It is committed to universal meaningful connectivity.

2 The **National Integrated ICT Policy White Paper** adopted in 2016, promotes universal access to affordable broadband services and digital skills development as catalysts for economic growth and social development. The policy emphasizes the expansion of broadband infrastructure to underserved areas. It promotes digital skills development by prioritizing digital literacy and skills training programmes, with a view to enabling South Africans to participate in the digital economy. It also promotes innovation and entrepreneurship.

3 The **National Digital and Future Skills Strategy**, which was adopted in 2020, envisages a society of digitally skilled South Africans. It sets out a structured series of initiatives that cuts across the education and skills development spectrum, from early childhood development and schooling to post-secondary education and training, recognizing that digital skills are needed for economic growth and social development. The strategy envisages the participation of multiple critical stakeholders, including Sector Education and Training Authorities and the private sector, through systematic engagement on key programmes to realize its vision.

Although these policies have encountered challenges in terms of implementation, they have also led to several flagship initiatives to promote youth digital skills development, employability and sustainable livelihoods. The most salient of these is the Presidential Youth Employment Initiative, which was implemented in the wake of the COVID-19 pandemic. The initiative includes a national pathway management network of stakeholders engaged in youth employment, so that they could cohere around a common digital platform from which young people could benefit.

[13] Government of South Africa, National Development Plan: Vision for 2030, National Planning Commission, 2012.

This baseline study was conducted against the policy backdrop described above and existing interventions and programmes to address the challenges facing YNEETs in South Africa.

3.4 Problem definition

Against the policy and programmatic backdrop described above, the central problem addressed by this study is the limited knowledge of the role that DASCs play in contributing to digital access and digital skills development as a basis for opening opportunities for employability, decent work and sustainable livelihoods for YNEETs. The study recognizes in particular that little is known about the sustainable connectivity and digital skills models that the DASCs may have developed to support YNEETs on sustainable livelihood pathways.

3.5 Research purpose

The purpose of this study is to explore affordable and innovative digital connectivity and access models that enable digital skilling and the creation of opportunities in the digital economy for YNEETs in rural, peri-urban and township communities in South Africa. It is also to analyse the lived experiences and lessons of DASCs in context, in order to develop relevant models and strategies that can be sustained and scaled over time.

The purpose of the study is informed by ITU and FCDO partnership in collaboration with DCDT to co-design a far-reaching digital inclusion project that seeks to effect positive change and support innovative approaches to regulatory issues, institutional capacity, inclusive technology and business models, connectivity financing options, digital skills and capacity development.

3.6 Conceptual framework

In South Africa, access to the Internet for rural and underserved communities, including YNEETs, has historically been provided by public telecentres or multipurpose community centres in rural areas. These centres have evolved and diversified over time, taking on different institutional forms and roles in servicing underserved and excluded communities. For the purposes of this study, these centres are referred to as digital access and skills centres (DASCs) and serve as the unit of analysis for the study.

The study applies the concept of sustainability with respect to the DASCs long-term viability operationally, technologically, environmentally and financially, to ensure that they can consistently enable YNEETs to become skilled, employable, entrepreneurial and digitally capable, able to sustain livelihoods for themselves, their families and their communities. The concept of sustainability is also informed by the 17 United Nations Sustainable Development Goals adopted in 2015, to which the South African Government, private sector and civil society organizations subscribe. The specific goals of relevance are:

- Goal 1: End poverty in all its forms, everywhere
- Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 8: Promote inclusive and sustainable economic growth, employment and decent work for all.
- Goal 10: Reduce inequality within and among countries.

The study adopted a business model approach to sustainability and its relevance to enabling YNEETs, drawing on an adaptation (Figure 3) of the Giga initiative conceptual framework of a business model for sustainable school connectivity[14]. Giga defines the business model for infrastructure deployment from the perspective of the interlinkages between technology, operating model, funding structure and cost structure. Sustainable business models are defined in terms of indefinite self-maintenance and non-dependence on external grants and donations. In appreciation of the relevance and influential nature of local socio-economic, cultural and political contexts, the study added the concept of contextual relevance. The Giga model is derived from the Osterwalder and Pigneur business model canvas,[15] which contains nine building blocks – customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships and cost structure – each of which is incorporated into the Giga model. When considered in context, the business model concept considers the DASCs as social enterprises with a public-good strategic purpose that extends beyond profit maximization.

The Giga approach, defines the operating model as the set-up needed to build, operate and maintain the connectivity infrastructure. This study expands this concept to the governance, management and administrative structure needed to oversee the operations of a viable DASC in the long term, in context.

The Giga model does not explicitly discern services as an analytical construct. This study proposes to include services because of the objective of the baseline research to make sense of models of connectivity and digital skills services to YNEETs. It therefore explores the nature of the services offered by the DASCs to YNEETs in the context of their social enterprise roles, combined with their need to be financially viable and sustainable.

The Giga approach, defines cost structure as comprising both upfront and ongoing expenditures, which are affected by regional characteristics and by decisions regarding technology, operating model and funding structure. The Giga approach focuses on identifying capital and operating expenditure as part of the cost structure. This study proposes a total-cost-of-ownership model that draws on the historical experience of applying that approach to school-based centres and telecentres in Africa. The total cost of ownership refers to an end-to-end cost structure that encompasses initial set-up capital costs, including sunk costs; ongoing capital costs; variable costs; costs of training and content; and anticipated hidden costs.

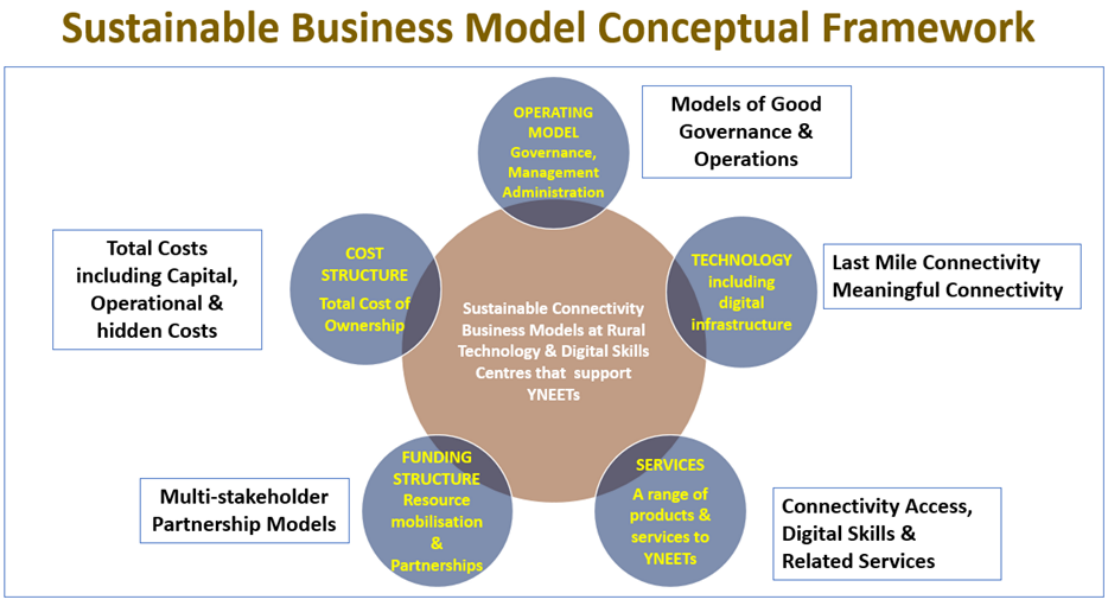
[14] Giga, Meaningful school connectivity: An assessment of sustainable business models, in collaboration with Boston Consulting Group, 2021.

[15] A. Osterwalder and Y. Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, 2010.

Regarding digital infrastructure or technology, the Giga business model refers to technology from the perspective of connectivity infrastructure, e.g. Internet speed. The study builds on this concept by including hardware, such as devices, servers, printers and secure software, alongside the maintenance, upgrade, refurbishment, replacement, reuse and responsible disposal of digital resources. Digital infrastructure also includes the physical infrastructure of the DASCs, such as buildings, access to electricity and running water, and the connectivity infrastructure, including access networks, fibre-optic cables, wireless networks, broadband networks, fixed-line and mobile broadband networks, and a range of access modalities for quality connections that can support the applications and services needed by YNEETs, such as high-quality video streaming, real-time communication and data transfer.

In the Giga model, funding structure refers to the use of one or multiple funding models to finance upfront and ongoing expenditures. In this study, the concept is expanded to incorporate resource mobilization strategies for sustainable connectivity and digital skills development. The study explores whether new and emerging resource mobilization strategies are deployed in underserved communities and whether they have the potential to expand Internet access and digital skills development for YNEETs. For this study, the funding structure also includes the partnership ecosystem at local, provincial, national and global level and its responsiveness to the needs of YNEETs. The study explores the DASCs partnerships with local community-based organizations, non-governmental organizations, private companies, venture capitalists, funding partners and national government departments.

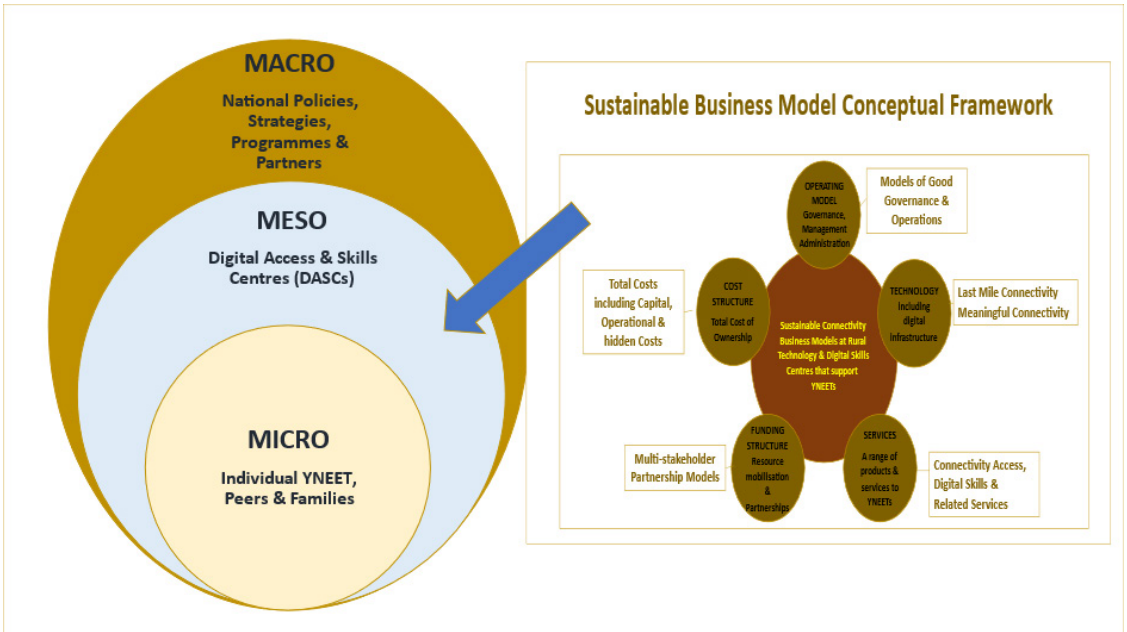
Figure 3: Conceptual framework for sustainable connectivity business models



Source: the author.

In addition, the study also conceptualizes the young person or YNEET user of the DASCs as a unit of analysis and applies an ecological systems model (Figure 4) that situates the YNEET and the DASC within a broader ecological system.

Figure 4: Individual YNEETs as a unit of analysis within a broader ecological system



Source: the author.

Figure 4 shows that the young person or YNEET, as an individual, interacts with peers and family at the micro level, which is serviced by the DASC at the meso level, which in turn resides within a broader macro system of national policies, strategies, programmes and partners that can influence the DASCs and the lives and livelihoods of youth.

4 Research design

The research was designed based on the mixed methods research methodology and thus incorporated quantitative and qualitative research methods. It comprised:

- A baseline study conducted via an online survey of 57 DASC managers/project coordinators and the resources and services that they offered YNEETs in three provinces of South Africa;
- Comprehensive case studies of three DASCs based on in-depth interviews with DASC managers and focus group discussions with YNEETs as users of DASC resources and services.

4.1 Establishing the baseline sample

The baseline study objective was to provide baseline profiles of DASCs in an initial three provinces: KwaZulu-Natal, Northern Cape and Eastern Cape. The initial intent was to establish a purposive sample of DASCs drawn from a database put in place by DCDT and its partners.

In line with the original terms of reference, the following selection criteria were applied to establish an initial sample of 90 DASCs in the three provinces:

- Situated in a rural town or village or township in Eastern Cape, Northern Cape and KwaZulu-Natal;
- Offering a range of digital access resources and services to young people, particularly YNEETs, in the form of digital devices, Internet connectivity, printing/photocopying/scanning facilities, etc.;
- Offering digital skills development opportunities for YNEETs to promote their employability, ability to engage in income-generating activities and sustainable livelihoods; and
- Having adopted business models and/or exploring strategies for the sustainability of their respective regional training centre.

The initial sample size of 90 DASCs was calculated on the assumption that an estimated ten DASCs were traceable in each of the three target rural or township areas in each of the three target provinces.

4.1.1 Revising the sampling strategy

During the process of developing the sample, it emerged that the number of 90 DASCs was an arbitrary figure not based on empirical evidence that 90 DASCs were operational in November and December 2023 in the initial three target provinces. The sample size was also not premised on an established database of DASCs in South Africa.

The study fieldwork revealed that little was known about the actual number of DASCs in South Africa. As a result, an initial list of 28 operational DASCs had been established by 9 November 2023. To expand this list, the sampling strategy was changed. The subsequent mapping and database development exercise presented an opportunity for expanding the study research methodology.

4.1.2 Establishing the population through mapping and database development

In view of the knowledge and data gaps on DASCs in South Africa in general, and in the three target provinces in particular, a process of mapping known DASCs and establishing a systematic database formed a central unanticipated feature of the research methodology and design. The number of provinces was expanded from the initial three to five by adding North West and Limpopo, and a mapping exercise was launched to develop a systematic database of the DASCs in all five provinces.

While recognizing the rationale for using machine learning and scanning satellite images to identify schools in the mapping exercise undertaken for the ITU Giga project[16], this study initially adopted a manual process for mapping the DASCs, building on existing databases and DCDT contacts and drawing on the researcher's networks and contacts.

DCDT database and contacts

DCDT provided a spreadsheet of its database of contacts that might support the study objectives. The database contained the names and contact details of 12 possible DASCs for inclusion in the sample. The spreadsheet was systematically reviewed to ascertain which of the contacts and names would fit the sampling criteria stated above, and ultimately six DASCs were included in the sample.

DCDT also provided additional contacts based on its partnerships with NEMISA CoLabs and specified DASCs. The addition of 10 contacts with whom the researcher engaged led to the inclusion of a further 10 DASCs in the sample.

Researcher contacts

The study researcher drew on her contacts and the networks of schools, districts and centres with whom she had worked in the past. Some contacts served as leads to further contacts. Through a process of systematic e-mails, phone calls and WhatsApp messages, a growing contact base emerged. Through this process, the researcher also discovered that a few of the DASCs suggested by her contacts were no longer operational. An additional criterion was thus added to the sample: that the centre needed to be operational at the time of the study.

Consultations with DCDT and ITU

The mapping and database development exercise also involved weekly consultations with DCDT and ITU-FCDO, to monitor progress. Through these consultations, additional names and leads emerged that were followed up by the researcher.

An emerging population of DASCs

Based on the mapping and database development process, the number of DASCs in the five target provinces increased from 28 to 56 between 9 November 2023 and 1 December 2023. The researcher, DCDT and the ITU-FDCO team agreed to continue to expand the database

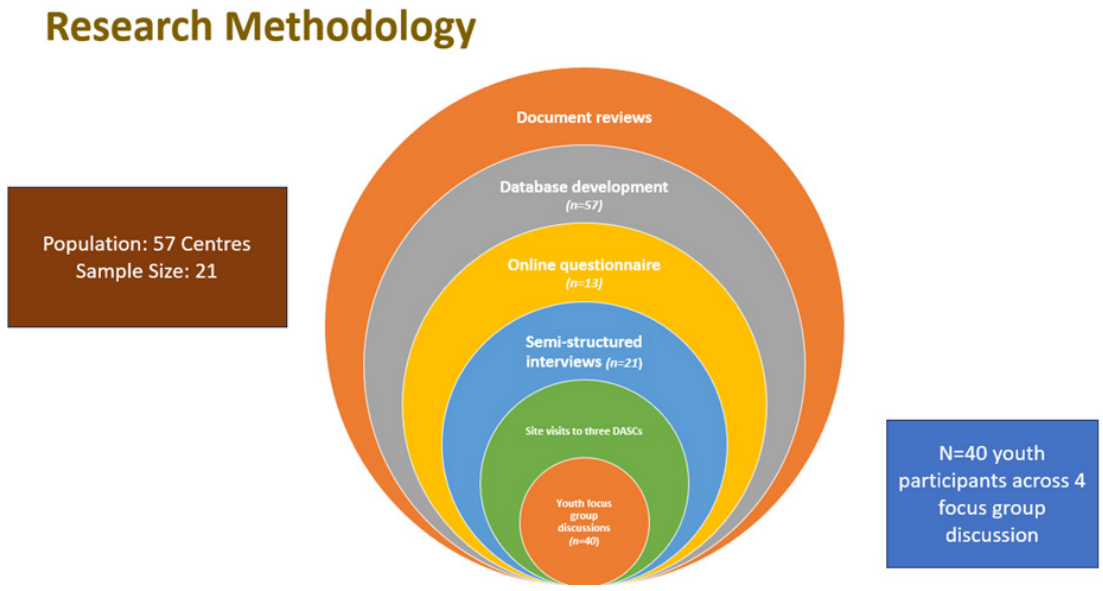
[16] See ITU, Giga expands its reach to 30 countries, advancing universal school connectivity, News, 9 November 2023.

until 14 January 2024, at which point a list of 57 DASCs had been determined. It was agreed that the 57 DASCs would serve as the sample.

4.2 Data collection methods

The study employed mixed data collection methods that included an online questionnaire, semi-structured interviews with a smaller sample of 21 DASC managers drawn from the sample of 56 DASCs, and an in-depth case-study analysis of three DASCs drawn from the 21 centres. The process is depicted in Figure 5.

Figure 5: Data collection process



4.2.1 Document and literature review

The study reviewed a range of relevant documents and literature, including reviews of research reports and concept documents produced by ITU and its partners on sustainable connectivity models and digital skills development. It also included reviews of each of the DASC websites, news reports, research reports and official documents, where these were available and supplied by DASC managers. It included a review of grey and academic literature on the conceptual underpinnings of the baseline study and empirical research literature on sustainable connectivity and digital skills development possibilities for rural, township and underserved communities in South Africa, particularly YNEETs. A list of the literature and documents reviewed is available from the author.

4.2.2 Online questionnaire

An online questionnaire was developed using Google Forms. The structure was informed by the study conceptual framework and the questions drew on the review of literature and relevant documents.

The online questionnaire contained both Likert scale and open-ended questions relating to the DASCs operational structure, connectivity models, digital skills models and business models. The questions included income and expenditure issues, to ascertain the DASCs resource

mobilization and sustainability strategies, including an assessment of the rates charged for the use of resources and services, the affordability of those rates and the extent to which YNEETs were prepared to pay for resources and services. The online questionnaire is available in Appendix B.

Based on the sample, 57 online questionnaires were sent out via e-mail in stages: on 20 November 2023, on 28 November 2023, on 1 December 2023 and again on 5 December 2023, with a follow-up from 11 to 15 January 2024 and a final cut-off date of 19 January 2024. Follow-up e-mails were sent over two weeks and the DASC managers and coordinators were called to encourage them to complete the questionnaire. In all, 13 DASC managers responded to the online questionnaire, a low response rate of 23 per cent. The study nevertheless analysed the responses, on the grounds that online questionnaires often yield low response rates and that the responses contained particularly interesting input.

4.2.3 Online semi-structured qualitative interviews

Online semi-structured qualitative interviews were held with a purposive sample of 21 DASC managers or coordinators and trainers from all five provinces. An online semi-structured interview schedule of questions was developed to guide the interviews. The schedule of questions is available in Appendix C. The questions focused on the history and operational model of the DASC, its connectivity models and its digital skills development and business models. They covered the programmes hosted by the DASCs to enable digital skills, employability, income generation and sustainable livelihoods, and strategies for the centre sustainability. The interviews also served to triangulate data drawn from the online questionnaire. The interviews were conducted with centre managers or coordinators via the Microsoft Teams™ online web conferencing platform. Each interview was recorded, transcribed and stored, with the respondent's consent, in a shared ITU folder.

4.2.4 Three case studies

Three of the 21 DASCs involved in the semi-structured interviews and online questionnaire were selected as case studies and the following data collection methods applied.

- A second in-depth interview was conducted with the centre manager or coordinator, to delve deeper into the DASC business model (particularly the finance model) and strategies for resource mobilization and sustainability. The interviews were scheduled between 7 and 12 December 2023. The schedule is also available in Appendix C.
- YNEET focus group discussions were organized with a purposive sample of between five and ten youth users at each of the three DASCs. Four discussions were held. One was organized online with youth users of Vexospark Digital Skills College in Tzaneen, Limpopo Province, on 14 December 2023, while the other three were held during the site visits to each of the three DASCs. A focus group discussion guideline document was prepared and is available in Appendix D.
- A site visit was conducted at each of the three centres between 31 January and 28 February 2024. Moses Kotane Innovation Centre at the Ndwedwe Library in Ndwedwe, KwaZulu-Natal Province was visited on 31 January 2024; Vexospark Digital Skills College in Tzaneen, Limpopo Province, on 8 February 2024; and the Lindamahle Innovation Centre in Mthatha, Eastern Cape Province, on 15 February 2024. A protocol developed to guide the site visits was developed and used.
- The case studies also required reviews of additional documents specific to each centre.

Table 3 summarizes the research design and data collection methods.

The methodology also included a stakeholder forum with partners and DASC managers, to present, discuss and validate the research findings. The forum was held on 21 February 2024 as a hybrid event and was attended by 25 people.

Table 3: Summary of research design and data collection methods

Research design	Data sources	Data collection methods	Research instruments	Means of verification	Data analysis
Baseline study	Project documents, inception report	Baseline document review	Document review schedule	Document summaries	Word clouds of key themes
	Online questionnaire of 56 (targeted 60) DASC managers and coordinators	Baseline structured online questionnaire	Baseline structured online questionnaire via Google Forms	Google Forms Survey responses	Google Forms analytics
	Sample of DASC managers for interviews	Semi-structured interviews with 21 centre managers and coordinators	Semi-structured interview Schedule of questions	Interview recordings and transcripts	Thematic analysis of qualitative data
In-depth case studies	Sample of three DASC managers/ coordinators for in-depth case studies	Second in-depth interview with managers/ coordinators	Interview schedule of questions for additional online interviews	Interview transcripts	Thematic analysis of qualitative data
	A sample of between 5 and 10 YNEETs using resources and services at each of the case study DASCs	One online focus group discussion with a sample of 5 to 10 YNEETs from one centre One focus group discussion at each site visit	Focus group discussion guidelines Interview schedule of questions	Discussion recordings and transcripts	Thematic analysis of qualitative data
	Site visits to the three case study DASCs	Physical visits to each of the three case study DASCs	A site visit protocol and guideline Photo documentation Video recordings	Site visit notes Photo documentation Video recordings	Thematic analysis of qualitative data

5 Baseline findings

The baseline findings and analysis are structured on the business model conceptual framework depicted in Figure 3.

5.1 Operating models

The interviews, online questionnaire and site visits revealed a range of DASC operating models for connectivity access and digital skills provision across the five provinces. Table 4 illustrates a taxonomy of operating models based on institutional status and corresponding governance, management and staffing structures.

Table 4: A taxonomy of South Africa DASCs

	Operating model	Description	Example
Public	Non-profit company linked to a for-profit company	The centre is registered as a non-profit and serves as the non-profit arm of a private company.	Digital Vexospark non-profit, linked to Vexospark Digital College Pty Ltd in Limpopo Province
	Public non-profit company functioning as a network of community cooperatives	Community-owned and -managed non-profit	Zenzeleni Community Networks in Eastern Cape Province
	Community-based non-profit registered as a public benefit organization	Non-profits can also register as public benefit organizations, which serves as a tax incentive.	Grassroots Hope in Northern Cape Province
	Network of centres as a division of a research institute registered as a non-profit company	The non-profit serves as a coordinating structure managing a network of centres.	Moses Kotane Institute in KwaZulu-Natal Province
	Units within public universities	Unit within a public university	NEMISA CoLab at Walter Sisulu University
Private	For-profit company (small or micro survivalist enterprise)	Registered as a proprietary limited company	Egsibit Training and Development in KwaZulu-Natal Province Bosele Skills Development Services in North West Province
	Small, medium or micro-enterprise linked to a non-profit company	Private company set up as a non-profit	Scatec Solar SA in Northern Cape Province

In the public domain, many of the DASCs are registered with the Companies and Intellectual Property Registration Office as non-profits under the South African Companies Act. They are also registered with the Department of Social Development and the South African Revenue

Services as Section 18A public benefit organizations, which affords them tax exemptions on income received.

As shown in Table 4, there are five types of public institution:

- **Non-profit companies linked to private companies**. Examples from the study sample are Scatec in Northern Cape Province; Digital Vexospark in Limpopo Province; and the Lindamahle Innovation Centre in Eastern Cape Province. By design, such an institutional arrangement serves as a basis for institutional and financial sustainability.
- **Community-centred non-profit companies.** Zenzeleni Community Networks in Eastern Cape Province is a well-known pioneering model. It was established as a non-profit company whose governance and management structure included traditional leaders from local villages in the Eastern Cape.
- **Non-profit companies** also registered as **public benefit organizations.** An example is Grassroots Hope in Northern Cape Province.
- **Non-profit companies operating as research institutes**. Such companies have a dedicated organizational division focused on supporting a network of established centres, such as the Moses Kotane Institute network of 14 DASCs across KwaZulu-Natal Province.
- **Operational units based at a public university** but serving as a DASC linked to a non-profit company. NEMISA seven CoLabs are an example. The CoLabs are operational units based at a public university and are institutionally part of NEMISA, which is a registered non-profit institute, is listed as a public entity in terms of the Public Finance Management Act and derives its mandate from DCDT.[17] The role of the CoLabs is to design and implement digital skills training programmes in rural and township communities.

The governance structure of the non-profits consists of a board of directors with between three and six independent members.

In the private domain, a few of the DASCs in the sample were registered as private companies and operated mainly as small and microenterprises. There were three categories.

- **Small enterprises set up in partnership with a non-profit arm.** Examples were Vexospark Digital College in Limpopo Province, whose non-profit arm was Digital Vexospark, and Scatec, an independent power producer in the Northern Cape that had set up a non-profit company that operated as a DASC.
- **Small enterprise associates or subsidiaries of larger private companies.** For example, MTN, a multinational network service provider operating as a leading digital company in South Africa, owned the MTN eStreet Mobile Internet Café.
- **Microenterprises.** These businesses operated as survivalist enterprises from an established institution. Examples are Egsibit in KwaZulu-Natal Province, which was based at a teacher development centre in Durban, and Bosele Skills Development Services in North West Province, which provided services to youth from a back room in a home in a township in North West Province.

The range of institutional forms and operational models in the baseline study sample may not cover all the many DASCs existing across all nine South Africa provinces. The DASCs registered as private small and microenterprises largely operated as social enterprises focused on providing a range of services for a social and public good objective; they were registered as private companies in order to be able to generate an income and survive as a business. That they operated as social enterprises was evident from the objective stated by all the interviewees to address immediate, pressing and urgent social needs, such as youth employability, poverty

[17] See NEMISA, About Us (accessed 24 January 2025), for further information.

and the associated assault on well-being and dignity. In the words of the Lindamahle Innovation Centre CEO:

> The situation with the youth in deep rural areas are so dire, I thought that I must do something and that drove me to set up this Centre.

That DASCs of this kind served as social enterprises was also evidenced by their interest in promoting what Sparviero calls social innovation[18], which is defined as consistently exploring new and creative ways to address the complexities of multifaceted social crises as manifested in local rural villages and townships in South Africa.

When asked about governance and management structures in the online questionnaire, three of the 13 respondents indicated that their centre had a board of governors, 11 out of 13 that it had an established management structure, and 10 out of 13 that it had a full-time manager.

All 21 centre managers who were interviewed invariably undertook activities beyond the management of their centre or network of centres. All were social pioneers and digital champions who secured funding and mobilized resources; developed networks, social capital and partnerships; recruited youth and community members to participate in various programmes; designed training programmes; and in some cases also ensured that participants were provided with meals during their digital skills training sessions. In the word of one of the pioneers of the Vexospark Digital College:

> I think I am the engine of Vexospark because I am the one who's doing their marketing with taking decisions and making sure that the company is running smoothly.

Similarly, the Lindamahle Innovation Centre CEO said:

> I have to keep on driving the centre with a very small team to ensure that our deep rural youth have opportunities to grow.

The digital champions in each of the DASCs had taken leadership responsibility to pioneer the centre establishment, maintenance and growth; they juggled many competing priorities, managed wide-ranging personal, professional and organizational constraints; and invariably developed various tactics and strategies to innovate and find creative possibilities to serve their respective communities and partners. The literature highlights the challenges and triumphs of digital champions in government contexts, mainly in the global North-[19] The study revealed that the DASC digital champions were often so overburdened with the responsibility to lead and innovate that they risked burning out, which in turn could threaten the sustainability of the very centres and institutions that they had pioneered. **Here the recommendation is to ensure that the DASC digital champions build leadership capability within their organizations as a basis for organizational stability and sustainability.**

5.2 Digital skills and capacity-building services

The questionnaire, site visits and interviews revealed that the DASCs offered community members, including youth (who were not exclusively YNEETs), a wide range of digital skills services and related capacity-building and wrap-around support services.

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[18] S. Sparviero, The Case for a Socially Oriented Business Model Canvas: The Social Enterprise Model Canvas, Journal of Social Entrepreneurship, Taylor & Francis Journals, Vol. 10(2), pp. 232-251, May 2019.

[19] See C. Wilson and I. Mergel, Overcoming barriers to digital government: mapping the strategies of digital champions, Government Information Quarterly 39, 2022.

All the interviewees indicated that their centres served communities of all ages but that most of the users were young people who were not necessarily NEETs. Many were students from nearby schools, although sizeable numbers were unemployed youth.

Table 5: Digital skills and related services

Level	Digital skills programmes	Work-readiness programmes	Business development and support	Value-added programmes	Connectivity access and related services
Basic	Basic digital literacy	Job readiness	Business registration	Mental health	Printing
	IT essentials	Career pathing	Project management	Nutritional feeding schemes	Photocopying
	Microsoft 101	Referrals	Soft skills	Creche	Scanning
	Basic digital literacy	CV preparation	Socio-economic development	E-learning or remote learning for university students	Internet café services: job searches, career guidance searches
	ICT training (end-user and technical support)	Job interview preparation	Be your own boss	Applying to universities	
Advanced	Cybersecurity	Girl mentorship programmes	Entrepreneurship training	Sports development	Remote learning for university courses
	4IR courses: AI, AI Lite, ChatGPT literacy, blockchain, coding, robotics	Corporate days Awareness-raising seminars	Business registration support and mentorship	Project management	
	Cisco programmes				

Table 5 provides an overview of the range of services offered by the DASCs. It shows that providing access to Internet connectivity was accompanied at many DASCs by a host of value-added services, ranging from access to printing (usually CVs) and copying/scanning devices to providing a place where community members could search for jobs, research post-secondary institutions or participate in webinars, conference calls and remote learning. In some cases, the community members were registered with universities offering remote learning opportunities, such as UNISA.

Table 5 also shows that digital skills programmes ranged from ad hoc one-off basic digital literacy courses to more advanced accredited digital skills programmes. The former included learning how to work with Microsoft Word, Excel and PowerPoint (e.g. at Grassroots Hope in the

Northern Cape). Almost all the DASCs offered basic digital skills training programmes, some of which were ad hoc while others were certified programmes such as Microsoft 101. The NEMISA CoLabs also offered a basic digital literacy course that covered a wider range of basic digital skills, such as browsing and Internet searches; setting up and using e-mail and social media accounts; online and mobile banking; basic use of word processors and spreadsheets; using e-government services; and basic cybersecurity. NEMISA also partnered with several DASCs that used the NEMISA platform for their basic digital literacy and Microsoft 101 courses.

Some of the DASCs offered advanced certified or accredited digital skills programmes across all the NEMISA CoLabs. The programmes included 4IR courses on, for example, AI, software development, data science and analytics, the Internet of Things, and blockchain. The courses were also accredited with IBM and Cisco. Several DASCs offered accredited programmes, such as the 12-month Cisco Networking Academy course offered by the Lindamahle Innovation Centre to 41 participating youth from surrounding rural areas.

Accredited training programmes with companies like IBM, Microsoft and Cisco were based on partnership agreements with the DASCs, in some cases via third parties such as NEMISA. In other instances, NEMISA trained trainers at the DASCs to deliver various courses, including accredited courses. Each of the DASCs also had full-time or occasional trainers and facilitators with expertise in the specified digital skills courses and programmes.

Work-readiness training services also featured prominently in the service offerings of DASCs and involved everything from job interview preparation to career pathing and CV preparation. Business development and support featured strongly in the portfolio of employability and sustainable livelihoods services (e.g. the services offered by the NEMISA CoLab at Walter Sisulu University in the Eastern Cape, see Box 1).

Box 1: Setting up a community-based mobile phone repair business

The NEMISA CoLab at Walter Sisulu University designed and delivered a specialized mobile phone repair training programme for 28 young people from Eastern Cape rural communities. The young people received technical skills training on repairing mobile phones and setting up a business. They were helped to register their businesses and given business mentorship. As a result, a few of the participants set up successful community-based businesses.

The course aimed to enable young people to set up their own businesses, namely shops that sold new and second-hand repaired mobile phones and accessories. It also potentially served as an electronic waste-management initiative focused on recycling old mobile phones and thus could tie in with strategies to grow green economy skills.

Another feature of some of the DASCs skills development services, such as Grassroots Hope in the Northern Cape, was that they also offered community feeding programmes, programmes on growing food and mental health support programmes (e.g. combatting alcohol abuse among young people and sports development programmes for young people and children).

The Zenzeleni Community Networks technology labs in schools in Zithulele village organized English classes and courses on growing food, to enable food security, alongside ICDL training.

The DASCs seem to have had some notable successes in providing connectivity to YNEETs. Out of the 13 respondents to the online questionnaire:

- Four said that the DASCs had helped most Grade 12 learners with National Student Financial Aid Scheme and tertiary institution online applications;
- Two said that they had enabled young people to apply online for opportunities;
- Two said that they had helped YNEETs find employment and taught YNEETs ICT skills;
- One said that it had been able to accommodate over 20 children at its e-learning centre daily;
- Some said that students could do research at the centre;
- One said that it had trained more than 5 000 YNEETs and rural women;
- One said that it had trained all the educators and students at the four surrounding high schools;
- One said that it had been able to borrow routers and gain access to data bundles for its students through partnerships with Digify Africa and Siyanfunda Community Technology Centre.

A defining feature of the digital and related value-added skills programmes was the culture of care and support observed at the centres visited. Lead champions played an obvious supportive role, ensuring that participating youth had eaten a meal and had basic necessities such as sanitary towels, so that young women in particular could participate meaningfully in the training programmes.

5.2.1 Youth responses to digital skills programmes

All 40 young people who participated in the four focus group discussions expressed gratitude for the opportunity to learn digital skills. The programmes had had a profound impact, in that many young people had started with little or no digital skills. In an open question response to the survey about what the young people had learned, a respondent from Lindamahle Innovation Centre stated:

> More than 50 per cent started at the centre not knowing how to even operate a computer. The first time they were told to open [MS] Windows was at the centre. They can now type and assist at home when their family members need to be helped with sending e-mails. Others can see themselves pursuing IT further because they have done research on the different companies and positions that hire people with the certificate they have gained. One of the participants has gone back to high school and was able to choose Computer Applications Technology as a subject because she was familiar with the subject and helps other students in class. A majority have saved from going to the Internet cafe.

The statement that young people from rural communities in particular had not "touched a computer" before participating in digital skills training programmes at the DASCs came up in a few interviews. The centre managers from Egsibit in KwaZulu-Natal, three centre managers from the Moses Kotane Institute and Vexospark Digital College, and the two DASCs in the Northern Cape echoed this sentiment. The Zenzeleni Community Networks experience in Zithulele, Eastern Cape, revealed that the team managing the computer labs had had to advocate the value that digital technologies could add to the lives of youth and older community members.

Asked about what they had learned, participants from Vexospark Digital College said in the online focus group discussion:

> I have learnt coding and robotics, and it has helped me a lot because I use it at home to assist young children at home whenever they get bored and tired of doing the same thing. I introduced coding and robotics to them. [Youth A]
>
> I have learnt cybersecurity, and it is helping me a lot in terms of the websites I visit lately. I can tell if the information sent or advertised is a scam or not and I am able to assist other people in the community. {Youth B]
>
> I have learnt Microsoft Office in the centre and have been able to assist other people. [Youth C]

The interviews with DASC managers also revealed that the young people who had completed digital skills programmes were frustrated at the disconnect between the certificates and qualifications obtained and the job opportunities available to them. They expressed an interest in developing "practical" employability skills linked to employment support services. Because the DASCs are mainly community based, the lack of access to income-generating jobs or business opportunities on completion of the digital skills programmes also influenced perceptions about the limitations of the centre when it came to acting as a conduit to income generation and improved livelihoods. This was particularly pronounced in the communities of Tzaneen, which is serviced by Vexospark Digital College. It also meant that the centre had to be cautious about raising expectations that digital skills would lead to jobs.

The experience of many of the centres offering digital skills programmes raised questions for many of the managers about the need to diversify their offer and move beyond the provision of digital skills programmes exclusively to include wrap-around support programmes that engaged with a broad array of youth vulnerabilities, including offering much-needed basic necessities such as sanitary towels for young women and social and emotional learning, care and support programmes alongside instruction on financial capability[20] and entrepreneurship, where the focus was on strengthening linkages between employer organizations and DASCs. The Moses Kotane Institute network of centres hosted Corporate Days, on which business leaders were invited to speak to young people about strategies for becoming employable in the corporate sector. Grassroots Hope runs mental health and support programmes for young people that could be further developed as part of the ethics of care approaches already adopted by some of the centres.

Several DASC managers were not aware of existing strategies and initiatives for employability skills development and building ecosystem linkages with pathways to livelihoods. Diversifying their offerings to include work-readiness skills, building on and leveraging the social and cultural capital in the communities and beyond in the quest to expand opportunities for youth, were recommendations that emerged from the interviews.

The study also found that much of the conversation was about young people as passive recipients or "beneficiaries" of digital skills programmes, which were not always designed with or by them in ways that acknowledged their individual and collective agency. The literature also suggests that little is known about the young people, their journeys and the transition from school to sustaining a livelihood from their perspective.

The literature also highlights the need to reframe narratives on youth employability and digital skilling as asset-based approaches that focus on the creativity and dynamism of young people,

[20] L. Graham et al, Siyakha Youth Assets Study – Developing Youth Assets for Employability, Centre for Social Development in Africa, University of Johannesburg, South Africa, 2019.

their capabilities, talents, street smarts (their "funds of knowledge") and community cultural wealth. Such approaches challenge deficit narratives about young people as have-nots that focus attention on what they lack as individuals, particularly when the absence of opportunities for livelihoods reflect structural deficits in the systems in which youth are embedded[21].

5.3 Technology model

The DASCs in the baseline sample offered public access to Internet connectivity for community members, most of whom were young people, including but not exclusively YNEETs. This is consistent with the findings of the NEMISA study[22] that 58.8.2 per cent of the 3 000 survey respondents reported having access to free Internet and that free Internet was accessed mainly from public spaces (31.6 per cent), work (30.7 per cent) and libraries (19.3 per cent). The study concluded that

> investment in public Wi-Fi appears to be yielding returns, and that users tend to some degree to congregate around free Wi-Fi hotspots. Such hotspots can be turned into opportunities for learning and digital upskilling.[23]

South Africa's national broadband policy, SA Connect aims to achieve 100 per cent population coverage delivering at least 10 Mbit/s, prices at no more than 2.5 per cent of the average monthly income by 2030.

5.3.1 Connectivity models

This section of the research is intended to provide a South African contribution to the growing evidence base mined by ITU on last-mile connectivity solutions[24]. The latter includes a database[25] of case studies, including from Africa, which this study also considered. The ITU Last-Mile Internet Connectivity Solutions Guide provides a typology of last-mile connectivity models that considers that DASCs act as ISPs, as shown in Figure 6.

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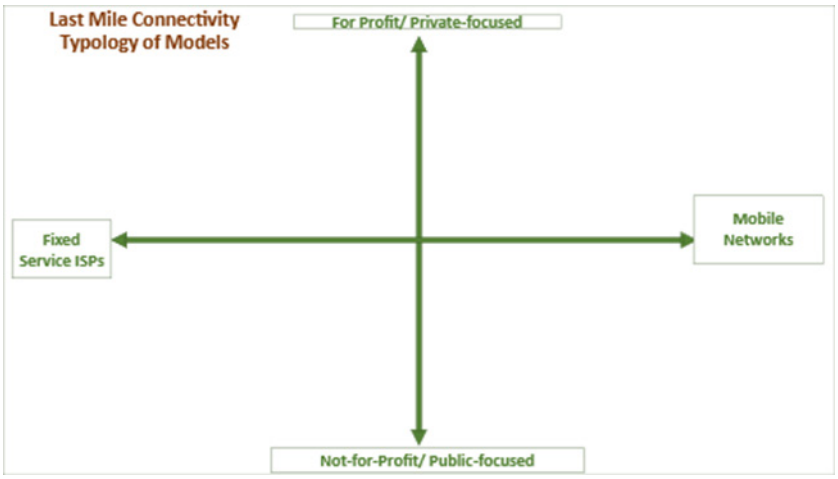
21 K. Schwartz et al., Seeking and Finding Positive Youth Development Among Zulu Youth in South African Townships, Child Development, July/August 2017, Vol. 88/4, 2017, pp. 1079–1086.
22 H. Twinomurinzi et al., Digital Skills in South Africa at the Citizen Level, NEMISA and UNISA,2021.
23 Ibid., p. 47.
24 ITU, 2020, Last-mile Internet Connectivity Solutions Guide.
25 University of Pennsylvania, Center for Technology, Innovation, and Competition, 1 World Connected (accessed 25 January 2025).

Figure 6: Typology of last-mile connectivity models, by type of network and profit considerations



Source: ITU, 2020, Last-mile Internet connectivity solutions guide

Almost none of the DASCs in the baseline sample were licensed ISPs; the exception, the Zenzeleni Community Networks (more on this model later), would fall in the bottom right-hand quadrant of the last-mile connectivity typology. This study therefore uses the meaningful connectivity progression model depicted in Figure 2 above. Many of the DASCs were at the basic connectivity level, while a few offered meaningful and sustainable connectivity models.

In terms of technology infrastructure, all the DASCs were housed in stable buildings that had access to electrical power though had to manage load-shedding schedules. One of the 13 questionnaire respondents said that it had generators to manage load shedding and the Scatec Centre in the Northern Cape worked with solar panels because it had been set up by an independent power producer.

One of the 13 questionnaire respondents indicated that it had adapted infrastructure for persons with disabilities, while three said that they had toilets and four indicated that they had adequate physical rooms.

All the DASCs also provided access to devices in dedicated rooms containing between five and 25 A-grade laptops or tablets and, to varying degrees, to printers, scanners, photocopiers and laminating machines. Some, like the Zenzeleni Centre in Zithulele, had set up a thin-client solution consisting of 25 Chromebooks and a server. Of the 13 respondents, eight indicated that they also made mobile phones available and six that they provided tablets for public use. Two respondents said that they made 3D printers available but none made assistive technologies available.

Besides providing access to digital infrastructure resources, the DASCs also operated on a bring-your-own-device model, where young users brought their own mobile phones, often smartphones, whether personally owned or shared.

In terms of connectivity infrastructure and access, a range of models emerged across the DASCs in the sample. All 13 respondents to the online questionnaire indicated that they provided connectivity access to YNEETs at their centres.

- 11 said that they used a range of wireless broadband technologies, including Wi-Fi and WiMAX, and mobile networks (mostly 3G) to provide Internet connectivity without physical cables.
- One used dial-up, an older technology requiring a standard telephone line and modem and often associated with slow Internet speed.
- One used Ethernet, which typically makes use of local area networks and can also be used to provide high-speed Internet connectivity.
- Two connected through a mobile phone hotspot, which involves sharing the Internet connection via data bundles from network service providers with other connected devices.

Table 6 provides an overview of the connectivity challenges that questionnaire respondents highlighted and the strategies they employed to overcome them. The table shows that many of the challenges were also beyond the DASCs control, particularly those related to load shedding, unstable networks and rainy weather. Judging by their responses, the centre managers had found ways to be resilient while considering approaching government agencies for further support. Individual centres had also considered limited options to address infrastructural challenges.

Table 6: DASC connectivity challenges and strategies

Challenges	Strategies
• Seven out of 13 respondents mentioned unstable power supplies related to load shedding. One said, "In rural areas load shedding takes place for long hours". One respondent mentioned four to eight hours, and sometimes the centres were left for days without electricity. • Two mentioned the unstable networks of all service providers in rural areas, made worse during rainy weather. • Three mentioned slow Internet speed when more than 10 people connected. • Two mentioned expensive data. One indicated that the Internet was expensive because "we currently buy data out of our pockets without funding". • Lack of incentives to buy data. • One mentioned long distances from technical support. • One mentioned "emotional outbursts due to frustrations and anxiety". • Another mentioned financial constraints.	• Seek alternative energy solutions. Application has been made to the Eastern Cape Development Corporation. • Seek funding for more stable networks. • Apply for support for broadband connectivity. • Use a UPS to keep routers running, but the main challenge is the network during load shedding. • Charge fees. • As expensive as data is, buy packages and, during periods of heavy load shedding, wait until the connection is restored. • Use power banks during load shedding. • Obtain donations.

Six out of 13 respondents believed that their connectivity access offer could be sustained over a long period of time, while another six believed that it could not. One preferred not to answer the question. Strategies for sustainability included charging for services and gaining formal accreditation so that the centres could offer accredited courses, to name the top two responses.

It appears from the questionnaire and interview responses that the provision of sustainable connectivity by most of the centres as more aspirational than actual, and some of them had proposed strategies that may well reinforce funding dependency instead of sustainability for meaningful connectivity.

5.3.2 Innovative connectivity models

Two innovative connectivity models were described during the interviews. The first involved the use of TV White Space at the Ixopo Centre, Moses Kotane Institute, in KwaZulu-Natal. TV White Space utilizes unused portions of spectrum in the frequency bands allocated for broadcast television. It thus offers another means of providing affordable and reliable wireless connectivity to underserved communities.

The South Africa Connect Policy acknowledges that spectrum is a scarce resource and recognizes the need to identify and reassign unused spectrum, to approve spectrum sharing between spectrum licensees and across services, and to enable dynamic spectrum assignments, while safeguarding the spectrum commons and spectrum required for public access technologies and services.[26] In 2018, South Africa's regulatory body, the Independent Communications Authority of South Africa, published regulations promoting TV White Space during the transition from analogue to digital television; those regulations made available certain frequencies for other uses, including broadband connectivity. TV White Space uses existing infrastructure, such as TV broadcast towers, that can be repurposed as TV White Space technology. These technologies can allow service providers to extend their coverage over large distances without the need for extensive new infrastructure deployment. TV White Space also operates on lower frequencies, allowing for improved signal propagation characteristics that enable better coverage over long distances in challenging terrain with dispersed populations, even through obstacles such as buildings and trees.

Because TV White Space can leverage existing broadcast infrastructure at a lower cost, it is also more affordable than the new infrastructure-intensive options offered by traditional broadband solutions. Moreover, the cost of end-user equipment is relatively low compared to traditional broadband solutions. TV White Space can therefore enable rural and underserved communities to access the Internet at affordable prices, thereby promoting digital inclusion.

The Ixopo Centre is one of the TV White Space initiatives in South Africa being explored through partnerships established by the Moses Kotane Institute. It draws on ten years of TV White Space trials by partnerships between big tech companies, research institutes and education stakeholders in schools and rural communities, with notable educational success.[27] There are also examples around the world of TV White Space projects for commercial applications that are delivering connectivity to hard-to-reach communities. With a supportive regulatory environment, various local TV White Space models are likely to emerge.

The second example is the well-known pioneering case of one of South Africa's first community-based ISPs, in rural Eastern Cape: Zenzeleni Community Networks. The network initially started as a cooperative model, with community members actively involved in its management and maintenance. It was built and is maintained by residents who receive training in networking

[26] A. Lysko, South Africa presses ahead with white space trials, Policy Tracker, United Kingdom, 2014.
[27] M.T. Masonto et al., Using TV White Spaces and e-Learning in South African rural schools, 2015 IST-Africa Conference, Lilongwe, Malawi, 2015.

technologies and are employed by the cooperative. Since 2022, still applying the cooperative operational model, the network has been overseen and managed by Zenzeleni Community Networks.

As a community-owned network working to provide affordable connectivity access to rural communities, Zenzeleni Community Networks was granted an exempted licence by the Independent Communications Authority of South Africa to provide connectivity access, initially to one rural village and later, by 2023, to three rural villages in Chris Hani District Municipality in the Eastern Cape.

One of the network features is that it started off as a mesh, a decentralized network that allows information to be relayed through a series of interconnected nodes, thereby extending Internet access to the most remote areas without relying on traditional telecommunication infrastructure. Each node in the network represents a device able to transmit and receive data. The nodes in a mesh network communicate directly, forming a peer-to-peer network that routes data through neighbouring nodes until they reach their destination.

In 2017, the network migrated from the National Research and Education Network (via Walter Sisulu University) to an uncontended fibre connection provided by a like-minded larger ISP, Easttel, opening up further opportunities to expand network reach.

The network provides hotspots in homes, businesses or public buildings such as schools or hospitals. In 2023, it was operating 64 hotspots in three villages, including at the public hospital and a junior secondary school in Zithulele and, until the end of January 2024, in another school in Mankosi village. The hotspots vary in reach, with some extending 500 m to 1 km, and have varying numbers of users (from 20 to 200). The price paid by the hotspot providers is generally fixed but Zenzeleni Community Networks recently started offering one-to-three-day data package options.

The two innovative models described above have generated considerable global and local interest and provide opportunities for further exploration and expansion in the South African context.

5.3.3 Connectivity access trends

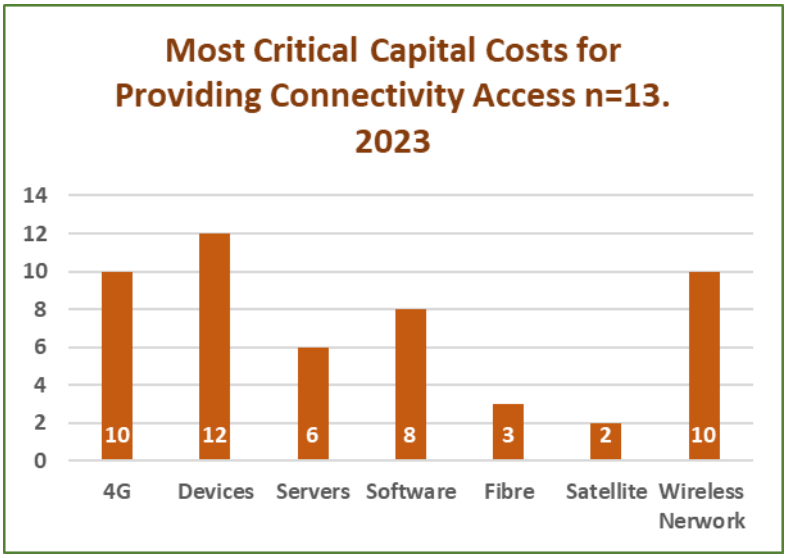
The literature suggests that the possibilities for low-cost, affordable and reliable Internet connectivity in rural and underserved communities are expanding. Shifts in the South African regulatory environment and advances in connectivity technologies are among the main factors influencing changes in the digital inclusion landscape in rural and underserved communities. Rapidly advancing 4IR technologies, particularly generative AI, also require regular universal access to high-quality, high-speed Internet connectivity. Many in the sector were looking forward to the advances in Wi-Fi technology[28] that would follow on the release by ICASA of the lower portion of the 6 GHz band for indoor Wi-Fi use in May 2023, and anticipated that network service providers would make new investments in the energy and connectivity ecosystem in the coming years[29]. Media reports suggest that stakeholders involved in digital inclusion programmes in South Africa will need to monitor and explore the new possibilities for reaching underserved communities.

[28] T. Szutowicz, Wi-Fi 7 is here – just how fast is it?, TechCentral, 16 January 2024.
[29] Vodacom to invest R1bn in KZN network, ITWeb, 3 February 2025.

5.4 Cost model

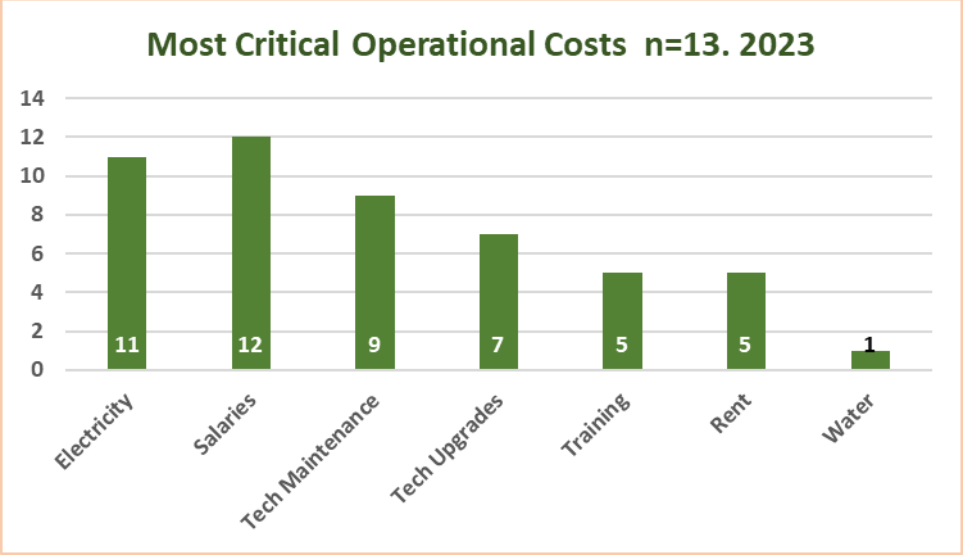
According to 13 questionnaire respondents, the cost of devices, wireless network connectivity and 4G were the most critical capital costs for ensuring access, as shown in Figure 7.

Figure 7: Most critical capital costs for providing connectivity access (n=13), 2023



According to the same respondents, their most critical operational costs were salaries, electricity and technology maintenance (Figure 8).

Figure 8: Most critical operational costs for providing connectivity access (n=13), 2023



When asked what their top five costs were for providing digital skills training, all 13 questionnaire respondents mentioned the following:

- Salaries
- Connectivity (data)
- Security
- Electricity

- Infrastructure – equipment
- Marketing
- Content – training materials, manuals.

Two respondents highlighted the cost of food, accommodation and transport, and one mentioned emotional support.

During the interviews and site visits, the centre cost structures were described in widely varying terms, largely because they differed hugely from one another. In consultation with the centre managers, ballpark estimates were made to inform an income and expenditure analysis of a "typical" DASC intending to supply meaningful connectivity, develop digital skills and provide wrap-around support for young people, thereby also integrating the cost of a values-based ethics-of-care approach to the design and role of the DASC.

5.4.1 Income and expenditure analysis: Total cost of ownership for caring DASCs

Table 7 depicts a straw-dog proposal for an expanded total-cost-of-ownership model based on the estimated costs of the three case study DASCs. It considers all possible costs, including the hidden costs of care and support, but excludes a host of cost factors associated with digital transformation, most of which are undercosted transactional costs (e.g. costs associated with organizational size and complexity, partnership and collaboration, regulatory compliance, downtime and legacy systems). The model proposed reflects an attempt to simplify costing and yet offer an expanded total-cost-of-ownership model for a typical centre, bearing in mind that there is substantial variety across the centres. As is shown in Table 7, the average cost for a centre such as Vexospark, Lindamahle or a centre belonging to the Moses Kotane Institute was approximately ZAR 2.3 million per annum. However, as indicated by the case study centre managers, lean budgeting could reduce total cost per annum to between ZAR 770 000 and 800 000.

In terms of income, Table 7 shows that the typical DASC received grant funding from a range of sources, including international donor or development agencies, such as GIZ, or United Nations agencies, such as UNDP or ILO. DASC managers also indicated that they received funding from provincial government departments or entities, such as departments of economic development and cooperation, and from national government departments such as DCDT. Their other sources of funding were philanthropic institutions, some of them local and others based in the United States of America. In some cases, the local municipality contributed towards a capital or variable cost item such as rent and electricity, but not in the form of cash grants; instead, it would cover the cost directly because the centre was based in a municipal building.

Centres also received donations in kind, in the form of equipment (e.g. solar panels) and services (experts who volunteered their time). These have all been listed as income. A few centres received funding from a range of sources, while others received funding through a government agency (e.g. NEMISA) only. Table 7 depicts an ideal scenario of income received from a range of sources.

In terms of expenditure, Table 7 shows the initial start-up capital costs of a typical fat-client lab equipped with an estimated 25 laptops plus servers, printers, scanners, copiers and air conditioning units. It also includes the cost of basic security, including strong rooms and burglar bars.

Table 7: Income and total cost of ownership per annum for a typical caring DASC

Income (in ZAR)		Expenditure (in ZAR)	
Donor income		**Initial capital costs**	
International development agency	500 000	Hardware: devices, servers, routers, printers, scanners, copiers, air conditioning units	300 000
International private company	100 000	Software, licences, cybersecurity	50 000
Local municipality	100 000	Research and development	100 000
National government department	100 000	Security	100 000
Provincial government department	200 000		
SUBTOTAL	1 000 000	SUBTOTAL	550 000
Income from service charges		**Variable costs**	
Income from fees per annum	10 000	Rent, electricity, water	36 000
Donations in kind		Content	144 000
Equipment	100 000	Salaries: managers, trainers	333 600
Data	20 000	Transport	66 000
Volunteers (donated time)	50 000	Meals, basic supplies	32 000
Solar panels and their maintenance	250 000	Licences	4 200
		Security	36 000
		Connectivity	12 000
		Depreciation	30 000
		Insurance	15 600
		Tech upgrades and maintenance	14 600
		Professional development	25 000
		Communications, marketing	30 000
		Stationery and supplies (paper, toner)	12 000
		Responsible e-waste management	115 000
		Training of an estimated 100 participants	500 000
		Food, care and support programmes	150 000

Table 7: Income and total cost of ownership per annum for a typical caring DASC (continued)

Income (in ZAR)		Expenditure (in ZAR)	
SUBTOTAL	430 000	SUBTOTAL	1 814 800
TOTAL INCOME	**1 430 000**	**TOTAL EXPENDITURE**	**2 314 800**
TOTAL INCOME in USD	**75 788.57**	**TOTAL EXPENDITURE in USD**	**122 767.73**

The list of typical variable costs shows that salaries are a major variable cost. Some centres hired trainers on an as-needed basis, usually as a one- or two-person team; in two cases, the team consisted of the founder/pioneer and another person. The variable costs column also includes costs not typically considered by the centres, such as depreciation, technology upgrades and maintenance, responsible e-waste disposal, and the cost of care (e.g. basic supplies such as toiletries and meals), which becomes apparent particularly when skills training programmes are under way. These costs were all checked and verified with the case study centre managers, who confirmed that they represented an ideal scenario.

Table 8 depicts a leaner cost structure in a more realistic scenario.

Table 8: Lean cost structure

Income (in ZAR)		Expenditure (in ZAR)	
Donor income		**Initial capital costs**	
International development agency	500 000	Hardware: devices, servers, routers, printers, scanners, copiers, air conditioning units	300 000
International private company	100 000	Software licences, cybersecurity	50 000
Local municipality	100 000	Basic security	50 000
National government department	100 000		
Provincial government department	200 000		
SUBTOTAL	1 000 000	SUBTOTAL	400 000
Income from service charges		**Variable costs**	
Income from fees per annum	10 000	Rent, electricity and water	36 000
Donations		Training	150 000
Equipment	100 000	Salaries: managers, trainers	333 600
Data	20 000	Transport	66 000
Volunteers (donated time)	50 000	Meals and basic supplies	32 000

Table 8: Lean cost structure (continued)

Income (in ZAR)		Expenditure (in ZAR)	
Solar panels and their maintenance	250 000	Licences	4 200
		Security	36 000
		Connectivity	12 000
		Depreciation	30 000
		Insurance	15 600
		Tech upgrades and maintenance	14 600
		Communications and marketing	30 000
		Stationery and supplies (paper, toner)	12 000
		Content	40 000
SUBTOTAL	430 000	SUBTOTAL	812 800
TOTAL INCOME	**1 430 000**	**TOTAL EXPENDITURE**	**1 212 800**
TOTAL INCOME in USD	**75 788.57**	**TOTAL EXPENDITURE in USD**	**64 323**

Table 8 is based on substantially reduced training and content costs relative to the expanded total-cost-of-ownership model depicted in Table 7, where the centre income could exceed its expenditure. In this respect, the centres could also consider a host of cost-containment measures, such as pooling resources with non-governmental and community-based organizations in the communities, sharing costs and exploring open educational resources, which would substantially reduce the cost of content, including training content.

During the interviews of the DASC managers, it became evident that they did not have a total-cost-of-ownership mindset because they had not taken account of many of the costs in the model in the first place. Depreciation, the cost of responsible e-waste disposal, technical support, upgrades and maintenance were among the crucial running costs that were not always considered because of the "hand-to-mouth" mindset of many of the DASC managers who were interviewed. What also emerged from the interviews was the value that the centres would derive from having access to financial management courses, coaching and opportunities to share strategies for streamlining costs and mobilizing resources and partnerships, as discussed in Section 9.

5.4.2 Cost drivers and determinants

As the Giga model[30] points out, and as shown in Table 9, a centre cost structure is influenced by a range of cost drivers and determinants.

[30] See Giga, Meaningful school connectivity report, 2021

Table 9: Cost determinants across a range of DASCs

Determinants	Centre logistics		
Operating model			
Registration status	Community non-profit with public benefit organization status	Non-profit without public benefit organization status	Private company/ micro-enterprise
Governance and management	Cooperative governance structure	Established board of directors and full-time management	Minimal governance and full-time management
Trainers and facilitators	In-house full-time trainers	Trainers hired as needed	
Administration	Dedicated administrative staff	Administrative tasks outsourced as required	No administrative staff
Technology model			
Internet speed targets	Up to 10 Mbit/s upload and download	More than 10 Mbit/s upload and download	More than 20 Mbit/s upload and download
Centre size	60 to 100 or fewer users per annum	Between 100 and 3 000 users per annum	More than 3 000 users per annum
Electricity solution	Reliance on national grid	Load-shedding back-up, such as power banks, generators	Solar energy
Centre remoteness	Remote	Rural	Peri-urban/urban
Security infrastructure	No security	Minimal security	Full-scale security solution
Funding model			
Partnerships	Primarily community-based	Government partnerships	Diverse: public, private, local, global
Resource mobilization	Funding dependency – government donors	Diverse public and private funding	Diverse public, private funding, resources and service charges

Table 9 shows the cost determinants of the institutional range of centres in the baseline sample as determined by a host of institutional and contextual factors. The taxonomy provided in the table is an opportunity for centres to identify their cost drivers, which can further inform their resource mobilization strategies.

5.5 Funding structure

When asked whether their centre has been able to secure long-term partnerships, three of the 13 respondents to the questionnaire answered "no" and 10 replied "yes", which suggests that there is a sense among centre managers that their centres could become financially sustainable through partnerships. When asked to explain their responses, those who indicated that they had been able to secure long-term partnerships said:

> We're on a good standing with ICDL.
>
> We have a long-term partnership with Siyafunda. We partnered with Siyafunda since 2016.
>
> We have partnered with the Department of Education to traine teachers and learners for more than eight years.
>
> We have long-term partner who funds 50 per cent of our costs.
>
> We have a partnership with the municipality.

Those who responded in the negative said that the partnerships they had initially developed (e.g. with the Eastern Cape Development Corporation) had not lasted beyond the initial support or that they had not secured long-term partners.

When asked about their top three sustainability challenges, all 13 respondents mentioned finances, Internet connectivity and load shedding. One respondent highlighted space constraints at the centre while another referred to working material, which could be a reference to limited training material.

When asked to name three of their most successful resource mobilization strategies, the respondents named the following:

- charging fees;
- cost sharing;
- partnering;
- seeking funds from government;
- personal loans;
- partnerships with different government departments, such as the Department of Public Works;
- hosting stakeholder days, which involved inviting prospective funders and sponsors to the centre;
- making the community part of the centre and developing a close relationship with it;
- working with traditional leaders and hosting community gatherings;
- encouraging personal donations and selling soft drinks and cookies.

These strategies suggest that the centre managers had been making efforts to mobilize resources and considered creative ways of doing so on an ongoing basis. The reference to personal loans is interesting because it reflects the extent to which centre managers, many of whom are also founders and champions of their respective centres and organizations, invest their personal resources in the centre management and operation.

Based on the interviews and site visits, the study found that the dominant funding structure of most of the DASCs in the sample was a funding dependency model. Indeed, the majority of the DASCs, including the small and microenterprises, said that they had received funding from

government, international or local donors and that a marginal amount of income had been derived from the sale of services, perhaps with the exception of the Zenzeleni Community Networks, which also operated as an ISP with an established low-cost connectivity solution whereby costs were covered by subscription income. Figure 9 maps the funding model against the institutional status of the DASCs in the sample.

Figure 9: Funding structure mapped against operating model

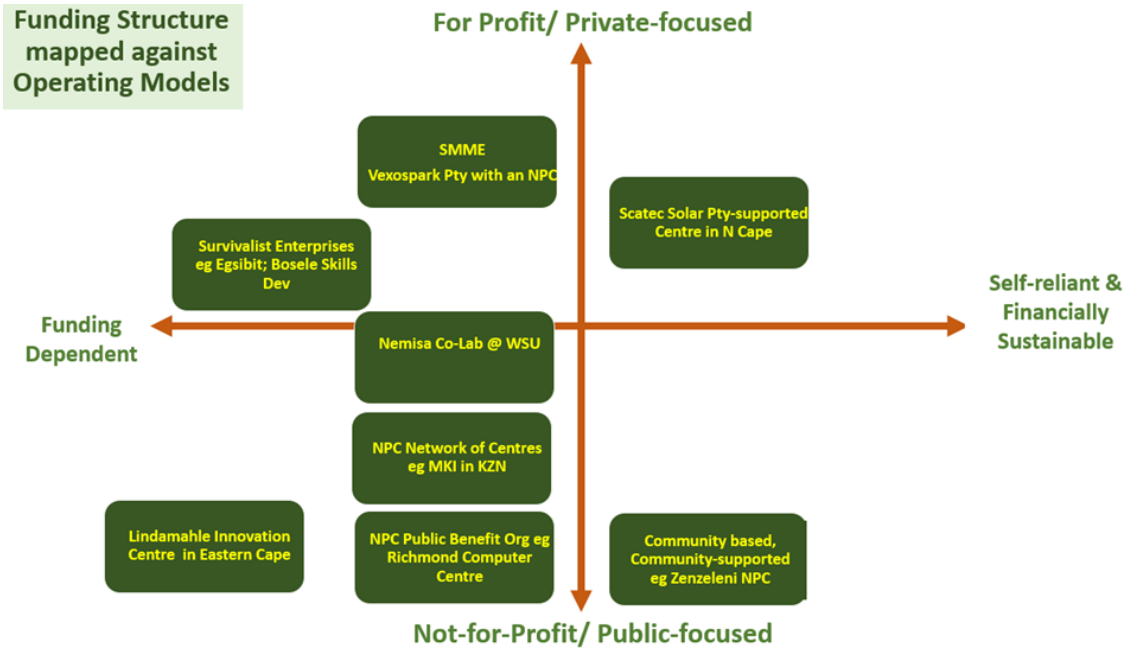


Figure 9 shows that most of the DASCs fell on the funding-dependent side of the funding and financial sustainability spectrum, including non-profits and small private enterprises. It also shows one private company in the Northern Cape that sustained the Scatec Centre and the Zenzeleni Community Networks non-profit as falling on the self-reliant and sustainable side of the spectrum. The funding- dependency model also applies to microenterprise start-ups in South Africa, which access venture capital, in some cases in the form of low-interest loans and in others on the basis of a sustainable business model. However, in South Africa as elsewhere, start-ups have had a high failure rate as experiments in establishing sustainable social enterprises, pointing to the complexities of becoming financially sustainable.[31] At the stakeholder forum hosted by ITU, FCDO and DCDT, the centre managers present concurred that Figure 9 reflected their reality and expressed interest in moving beyond the funding-dependency model. The implications are that there are currently limited DASCs that are financially sustainable and offering sustainable connectivity and digital skills services. However, the interest of the DASC managers in exploring possibilities for sustainability is a source of hope, particularly in view of South Africa's history of various permutations of digital access centres, many of which have not lasted, a further issue highlighted at the stakeholder consultation.

[31] D. Stevanovic and M. Ochieng, Growth and Success: In the Context of Startups in Sub-Saharan Africa, Degree Project in Entrepreneurship and Innovation Management, KTH Royal Institute of Technology, Stockholm, Sweden, 2023.

Upon closer examination of funding sources and income streams, the following funding archetypes were found to prevail across the range of centres in the baseline sample:

- Community-centred: the Zenzeleni Community Networks non-profit company is a typical example;
- Government-funded: Moses Kotane Institute centres are a typical example;
- Commercially sponsored: the Scatec Centre is a typical example;
- Diverse public and private partners: Lindamahle Innovation Centre and Vexospark Digital College are examples;
- Philanthropy-funded: Grassroots Hope in the Northern Cape.

Clarity on the funding archetype that applies to each centre would allow the centre concerned to explore relevant strategies for diversifying partnerships and resource mobilization.

5.5.1 Subscription models

Of the DASCs in the baseline sample, Zenzeleni Community Networks operated as an ISP with a subscription model. The rest offered Internet access either at no cost to the user or charged a monthly membership fee for Internet access and other training services at the hub/centre.

The subscription model involved providing hotspot access to customers such as businesses, organizations or homes. The centres offered tiered pricing options to accommodate different institutional or home-based entities and their income levels, allowing community members to choose a subscription plan in line with their budget and needs.

The different tiers offered varying levels of Internet speed and data caps with corresponding pricing. For example, Lubanzi Junior Secondary School in Zithulele village was a fixed-line subscription customer that paid for a connectivity package comprising 4 Mbit/s uplink and 3 Mbit/s downlink at a price of roughly ZAR 339.00 (equivalent to USD 18.03) per month. Zenzeleni Community Networks also offered flexible payment options, including cash payments and electronic fund transfers. In some cases, it subsidized the cost of Internet access for low-income households or relied on community support to keep subscription fees affordable. The latter involved donations, grants or other forms of financial assistance from funders or organizations.

The Zenzeleni model serves as an example of promising practice in South Africa and internationally; it is replicable, scalable and sustainable in an enabling regulatory environment and with capable leadership.

5.5.2 Willingness to pay, affordability and the DASC user base

The study objective also involved exploring whether and how YNEETs and youth users of the DASCs were willing to pay for services as a basis for developing a financially sustainable trajectory. When asked in the online questionnaire whether they charged YNEETs to access their services, 10 out of the 13 questionnaire respondents said that they did not charge for services while three said that they did. During the interviews, all 21 interviewees indicated that they did not charge for digital skills training services, three that they charged for printing and photocopying only, and one that it charged a minimal amount for accessing the Internet.

When asked whether youth were willing to pay, three of the 13 said that young people were sometimes willing to pay and 10 said that they were not.

During the four focus group discussions, some young people indicated an openness to being charged for services and went so far as to suggest that the centres should charge minimally for some services. For example, one young person participating in the online discussion with Vexospark Digital College said:

> I suggest that we pay 100 rand per month to assist the centre with Internet connectivity because we use more data whenever we come to the centre. One hundred rand is too little compared to the Internet that we are using.

However, the few who were confident enough to respond to questions about willingness to pay in the focus groups also expressed opposing views. Two explained:

> I'm not quite sure hey, but I think there would little money paid, papers are expensive and so is ink, okay you can access the Internet but when you want to do the copies you can pay that little amount, maybe 1 rand per page so that ink is bought. I think that would be better, you can't just print for free.

Another said:

> I don't think as young people we would be happy if we had to pay, because we are not working. So, if we were to pay, that would be too much for us, we wouldn't be happy about that.

The youth focus group discussions and the interviews with centre managers revealed mixed views across the sample, with some being open to having the centres explore charging young people for certain services while many others also expressed concern about being asked to pay for services under conditions of severe financial constraint. These responses suggest that the DASCs could engage further with youth participants and users on strategies to sustain the centres in ways that also encouraged their agency in relation to the centres and the relevance of its activities and services for youth in the communities.

The study also explored the prospects for affordability of the services offered by the centres. The target user base includes community members of all ages: school-age children who use the centres during the school holidays; youth who are studying, partially employed or unemployed; women; and people with disabilities. In the questionnaire, some DASCs specified that they provided capacity-building services for black NEETs and predominantly African and rural communities. When asked how many young people used the centre on any given day on average,

- two said between 0 and 10;
- two said between 11 and 20;
- five said between 21 and 30;
- four said more than 30.

When asked how many people in all had used their centre during the year between 1 November 2022 and 31 October 2023, the numbers ranged from a low of 60 to 11 231. Each of the 13 respondents gave different numbers, with two indicating that they had more than 1 500 users per year. The rest answered

- 300
- 512
- 60 to 100

- 1 000
- 2 000
- 3 000
- More than 3 000
- 5 000.

Some of the user numbers appear very low as per annum figures. For instance, 60 to 100 users per annum would amount to between five and eight users per month on average, compared to the highest number of users mentioned (11 231 for the year), or an average of about 935 users per month.

When asked about the profile of the users, the questionnaire respondents, corroborated by the interview responses, revealed a wide-ranging, segmented base of users and participants. Four interviewees replied, "We service community members of all ages." Questionnaire respondents listed the following:

- Girls
- Rural communities
- School students
- University students
- NEETs
- Small, medium-sized and microenterprises
- Persons with disabilities.

Evidently the DASCs have a wide-ranging user base, which means that they can explore how to develop models that are user-centred and develop young people's agency so that they, too, are actively engaged in finding sustainable alternatives for the DASCs.

6 Conclusion and small-win recommendations

This baseline study was designed to explore the status of DASCs in five provinces with reference to their role in providing access to Internet connectivity to youth, particularly YNEETs, in rural, township and underserved communities. The objective was to review the models of connectivity provided by the DASCs and whether they offered innovative and sustainable possibilities.

The baseline study also sought to explore how connectivity and access could lead to sustainable livelihood opportunities for YNEETs and how the digital skills programmes of the DASCs further reinforced and opened avenues for enabling livelihood opportunities.

The first primary research question was worded as follows: *What is the nature of the sustainable connectivity models and digital skills and capacity-building strategies at DASCs and how responsive are they to the skills, employability and livelihoods needs of YNEETs in context?*

The subquestions below related to this overarching primary question.

1 What are the essential elements for a sustainable digital skills connectivity operating model across various types of digital centres in South Africa?

The baseline study revealed a spectrum of operating models across the sample, ranging from for-profit microenterprises (such as Vexospark Digital College) to community-owned and -led non-profit companies (such as Zenzeleni Community Networks), each with its own governance, management and administrative structures. Some "centres" took the form of operational units based at public universities (e.g. the NEMISA CoLabs) or of non-profits that served as the non-profit branch of a for-profit company as part of sustainability strategies, such as Lindamahle Innovation Centre.

The study also challenged the assumption that the operating models were sustainable; when the operational structures were juxtaposed against the centre funding structures, it found that most of the centres in the study were funding-dependent, with two exceptions: Zenzeleni Community Networks non-profit and the Scatec Centre in the Northern Cape. The latter's sustainability was linked to its association with a for-profit independent power producer that sustained its operations. The study found that in the case of for-profit microenterprises, two in the study were survivalist enterprises that struggled to have a regular and consistent income allowing them to remain operational.

Deploying a range of operational models, the DASCs mainly secured connectivity access through subscriptions with network service providers.

2 What are the sustainable financing approaches applied to support meaningful connectivity at DASCs?

The study found that two DASCs had sustainable financing strategies in place. One was the Scatec Centre, which had been established by an independent power producer in the Northern Cape that leveraged its networks in support of the centre, including by having companies in its ecosystem supply the centre with material resources such as solar panels and security solutions.

The second was the community-owned Zenzeleni Community Networks, which was run like an ISP, with a multi-tiered subscription model that had enabled the network to grow over the previous three years and become self-sustaining thanks to additional subscriptions.

While most of the centres in the sample were found to be funding dependent, each had also explored strategies to reduce its dependency on single donors, by trying to diversify its funding partners; by charging for some services, albeit minimally; by exploring cost-sharing opportunities; and by engaging with community and traditional leaders able to convene and mobilize communities in support of the centre's activities. These strategies had worked to some extent but were insufficient to ensure sustainability. Sustainable options and pathways remain an important area for further exploration with all the DASCs. These could include strategies that are more organized and systematic about pooling resources, sharing costs, enhancing negotiating powers for preferential pricing and continuously exploring low-cost, reliable and quality connectivity options.

3 How responsive are DASCs to the connectivity access, digital resources, skills and livelihood needs of YNEETs in their communities?

From the youth focus group discussions, the study found that all youth acknowledged the supportive role played by the DASCs in their lives and skills development, expanding their opportunities and horizons. Several youths who participated in the focus group discussions were already employed; others remained unemployed but were still studying and thereby not, strictly speaking, NEETs. The focus group discussions also revealed that some of the young people were creative and resilient, having found ways to raise money so that they could participate in the digital skills programmes offered at the centres. For example, at Lindamahle Innovation Centre in Mthatha, Eastern Cape, one young person indicated that she sold her hairdressing services to be able afford transport to the centre. Another said that she had found a place to stay near the centre, to save on transport costs.

Some young people also highlighted how challenging they had found it to secure employment or income-generating opportunities following their digital skills training and recommended that the centres offer programmes that prepared them for the world of work and business in ways that were more practical, hands-on and relevant.

4 What are the most salient lessons that can be learned from the experience of DASCs across a spectrum of contexts about sustainable connectivity models and digital skills development strategies for YNEETs?

The study found that there were many lessons to be learned. The most salient across all of the DASCs are described below.

- The centres were led by dynamic digital pioneers who had founded, steered and led their establishment, direction, management and outreach in the community. Those pioneers had built community partnerships, grown networks and fostered relationships with government and private sector companies and agencies in support of expanding opportunities for YNEETs, enabled by digital connectivity and skills. It is a testimony to their leadership, dynamism, commitment and passion that many of the centres had made progress, providing a supportive and enabling environment for YNEETs. The lesson is that lead champions tended to burn out and leave the systems that they had started unless they were encouraged to take care of themselves, to establish a culture of care within their organizations and to build a leadership cadre for their replacement and to ensure capacity and continuity.
- The various DASCs were unfamiliar with one another, which meant that they lost the opportunity to gain insights, share experiences, learn lessons and possibly even negotiate collectively around shared interests.

- The DASCs knew little about the innovative connectivity models and last-mile solutions tried in South Africa, in Africa and across the world. This was also attributed to the absence of a platform for sharing knowledge and experience and thus developing a community of practice among disparate DASCs.
- The centre founding leaders had already established a culture and ethics of care, having overextended themselves to support young people facing often precarious circumstances. The care strategies included buying food and personal toiletries for participants, with the centre managers tapping into their personal financial resources to support youth participants in this way. In one example, one of the centre managers considered taking out personal loans to ensure that the centre was viable financially. The lesson is that integrating the culture of care and support and creating communities of belonging among youth can be cultivated more consciously by mobilizing partnerships and resources.
- The centres offered a wide array of services beyond digital connectivity access and digital skills development. They fostered community belonging among young people, who leveraged those resources to support their interests. The resources included spaces where university students could connect to remote learning opportunities. The lesson is that the variety of services available via the centre also opens opportunities for the centres to engage with partners to expand potential income-generating services.
- One feature of the centres was that youth were often spoken about as if they were passive recipients of various training opportunities. As learned from many youth initiatives worldwide, investing in asset-based approaches that focus attention on growing the individual and collective agency of youth in ways that harnesses their community cultural wealth can enable them to support and take ownership of the role that the centres can play in communities.

The second primary research question was worded as follows:

> What measures need to be sustained, improved, introduced and strengthened to increase sustainable access and use of digital technologies for YNEETs in rural South Africa for meaningful training and jobs?

The next section addresses this question and its related subquestions.

6.1 Connectivity models

The subquestion asked was:

> How can DASCs be placed on a sustainability trajectory based on the model of connectivity sustainability that emerges from this study?

The study found that for the centres to provide meaningful connectivity access sustainably they would have to consider a range of strategic concerns.

- By applying the ecological systems model shown in Figure 4, the centres can develop a world view beyond their centre and its immediate partners and become part of a broader provincial and national ecosystem of stakeholders engaged in the quest to promote universal meaningful connectivity. For example, provincial government departments responsible for municipalities and local economic development are engaging in provincial strategies to ensure that all municipalities are connected. The centres are already hubs for operationalizing community access to meaningful connectivity and many already have partnership agreements and arrangements with local municipalities. In KwaZulu-Natal, the network of centres at the Moses Kotane Institute offers a model for operationalizing provincial strategies for connectivity access and digital skills provision; it also explores innovative avenues for affordable, reliable and sustainable models, such as the TV White Spaces model in Ixopo. And because the network has a province-wide view, its approach is to expand the number of centres on an ongoing basis so that it can reach the entire

province. Adopting a provincial and national ecological view will also allow centres to map relevant stakeholders with whom they are already partners and identify stakeholders with whom they have not yet engaged in relationship building, particularly stakeholders in the meaningful connectivity ecosystem.

- One significant challenge facing all the centres is load shedding and, in rural communities, the ensuing hours of downtime over longer periods. In this respect, the centres are encouraged to expand their energy solutions and explore energy partnerships, including with independent power producers, as in the model in the Northern Cape. Network service providers are also reportedly embarking on various plans to address the energy challenges at provincial and national level. These, too, present opportunities for DASCs to develop strategic partnerships that can expand their capabilities to deliver meaningful connectivity.
- Another opportunity is for the centres to leverage the regulatory environment to their advantage by exploring innovative, low-cost and reliable connectivity options, such as those tested by the Zenzeleni Community Networks and the TV White Space initiatives in Ixopo, KwaZulu-Natal.
- A further option is for DASCs to collaborate and engage with network providers and related partners for preferential pricing in support of delivering services for the public good, particularly focused on growing digital capabilities of youth in the communities.

The above are examples of small-win strategies that can catalyse larger systemic change and enable meaningful connectivity. Small wins are immediate, concrete, implementable actions that decision-making stakeholders can take when confronting increasingly complex systemic challenges. They draw from systems practice.[32]

6.2 Finance models

The approach to financing DASCs so that they can act to provide connectivity access and develop digital skills entails moving beyond the current funding-dependency model.

Recommendations and small-win strategies for financial sustainability are set out below.

- **Explore alternative models of sustainability practice**: The DASCs are encouraged to develop their social and cultural capital as a basis for a sustainable system that can leverage and mobilize financial capital. This means strengthening relationships with community formations, structures and organizations in ways that tap into indigenous knowledge systems rooted in sustainability practices. These can become the basis for developing financial models that are locally relevant and sustainable. For example, partnerships with community ecosystem stakeholders, including traditional leaders, community formations (youth, women's organizations), faith-based organizations, local businesses and development and government agencies, would allow the centres to lay down deeper roots as a community hub while maintaining their core role as connectivity access and digital skills providers. In addition, diversifying the services and support for youth can open opportunities for leveraging local resources. Community hubs that foster care and belonging among youth can be integrated into the offer of connectivity and skills development. Care-centred approaches have characterized the ways in which the Social and Solidarity Economy has been harnessed by various development financing institutions in South Africa. With such an approach, digital inclusion becomes integral to social cohesion and economic and social inclusion.[33]

[32] K. Weick, Small wins: Redefining the scale of social problems, American Psychologist, Vol. 39(1), 1984, pp. 40–49.

[33] ILO and Research EQ, South Africa's social and solidarity economy: Alignment of the policy with national, regional and international frameworks, November 2021.

- **Explore various development financing avenues:** The centres are also encouraged to explore development financing avenues that support their development as sustainable community businesses. For example, the Industrial Development Corporation's Social Employment Fund has established strategic implementation partnerships with 1 000 grassroots organizations. The centres are and can be positioned as grassroots formations serving broader development objectives that integrate digital access/skills development and livelihood opportunities. Similarly, the Small Enterprise Development Agency has programmes that can be tapped to support microenterprises with business development.

6.3 Technical models

With reference to small wins in terms of technical models, the centres might consider infrastructure sharing, particularly in hard-to-reach areas where infrastructure can be shared with established government and private sector entities. For example, in the United Kingdom, Poland[34] and several African countries, national research and education networks linked to universities have been able to share infrastructure with community clinics, libraries and schools. The network backbone typically uses points of presence located in the same cities and towns as the institutions concerned.

6.4 Further recommended small wins

Based on the baseline research findings, it is recommended that DCDT, ITU and the FCDO consider the small wins described below.

6.4.1 Map digital access and skills centres in South Africa

One of the study's first activities was to find out who the DASCs were and where they were located. This process led to a search for the DASCs established in the five provinces concerned and eventually to the development of a database of DASCs. The process was not comprehensive, and further action will be needed to discover where else DASCs might be enabling digital access and skills development for youth, and ultimately to map all DASCs across South Africa, to gain further insight into how rural and underserved communities can be supported, and into the nature and reach of DASCs across the country.

6.4.2 Establish a collaborative network of DASCs in South Africa

Many of the centre managers expressed keen interest in being linked to a community of practice or collaborative knowledge network of centres with common interests and experiences that could be exchanged. The centre managers and their leadership structures would feel less like they were on their own in dealing with their respective sustainability challenges. They suggested that online biannual meetings would serve as valuable opportunities for the exchange of knowledge. This is something that DCDT and ITU could arrange at minimal cost.

DCDT and its partners could act as facilitators and establish a collaborative network that would also facilitate partnerships between the DASCs, on the one hand, and the Sector Education and Training Authorities, government agencies and business associations, on the other.

[34] A. Binczewski, Connectivity and Services Provided by the NREN to Libraries in Poland, in Report on Examples of Extension of Research Networks, TERENA, 2003, pp. 125–137.

A collaborative network can also leverage shared tools and applications to support their sustainability strategies. These include tools and templates for developing business plans, drafting contracts, engaging private sector partners, managing organizational finances, and drawing up cost containment and resource mobilization strategies, as suggested by the centre managers during the interviews.

6.4.3 Build bridges between centres and employer associations

The centres expressed keen interest in focusing their services on growing practical livelihood opportunities for youth. One strategy to that end would be to establish stronger linkages with employer associations and organizations, so as to give the centres access to information about employment needs and how they could tailor their skills development programmes based on skills demand.

The DASCs could also partner with existing national flagship initiatives, such as the National Pathways Management Network[35] linked to the Presidential Youth Employment Intervention. By plugging into existing initiatives, the DASCs could also contribute to national strategic youth employability interventions.

6.4.4 Partnerships with higher education institutions

During the stakeholder consultation, the DASCs were strongly encouraged to consider formal partnerships with universities and with TVET colleges engaging in technical and vocational education and training, particularly those offering remote learning programmes. A few of the centre managers said that university students used their centres to access the Internet so that they could participate in webinars, attend online lectures or work on their research projects. The suggestion that formal partnerships with UNISA aimed at making the DASCs university centres was endorsed by many of the centre managers. Here, too, DCDT, given its relationship with the Department of Higher Education and Training and with ITU, could act as a facilitator in brokering the relationship with the universities.

6.5 Policy recommendations

Given the role that they play in enabling digital access and digital skills development among marginalized and excluded communities, the DASCs contribute to the realization of the South Africa Connect Policy pillars linked to the National Broadband Policy adopted in South Africa in 2013. The four pillars are:

1. Digital readiness (restructure markets and institutions to create an environment for broadband investment and to promote competition).
2. Digital development (pool public sector demand to address public sector needs by providing broadband connectivity).
3. Digital future (introduce an open access wholesale fibre and wireless network).
4. Digital opportunity (stimulate demand through general awareness and e-literacy programmes).

[35] See A National Pathway Management Network to connect young people to opportunities, Presidential Youth Employment Initiative, Factsheet 1, n.d.

At the time of writing, Phase One of the South Africa Connect Policy had been completed and Phase Two was being launched in different parts of the country;[36] a key policy consideration would therefore be to include the DASCs in the Phase Two policy implementation plans that focus on community centres. This will also enable the targets set out in the South Africa Connect Policy to be realized within the stipulated time-frame.

It is also recommended that the technical, finance and cost models be taken into account as reported in this study's findings, and that the small wins proposed be incorporated into the South Africa Connect Phase Two implementation budgets and plans.

[36] L. Masia, South Africa Connect, Official Information and Services, South African Government, 4 March 2024.

7 Proposed implementation plan

Table 10 below sets out a logical framework for the implementation of the small wins proposed above.

Table 10: Logical framework for the implementation of small wins

Towards a Digital Access and Skills Centre Network			
Inputs	Activities	Outputs	Short Term Outcomes
Budget Partners Governance Structure Technical Teams Service Providers	Mapping DASCs in South Africa	A fluid map of DASCs in SA	Knowledge of location DASCs per province
	Host 2 x DASC Stakeholder Forums	2 x DASC Stakeholder Forums	Knowledge Exchange between DASC managers and partners
	Establish a DASC Network Community of Practice	A DASC Network and COP	A platform for ongoing engagement, knowledge sharing and community formation
	Identity Professional Development Opportunities	A list of PD Courses to support DASC Managers	DASC Managers as lifelong learners
	Make available DASC Tools and Templates via DCDT Website	DASC Business Plan Financial Management Tools Made Available to DASCs	DASC Managers improve the sustainable leadership and management of their Centres
	Partner with Employer Associations and link with National Pathways	Partnerships with National Pathways Project & Employer Associations Brokered	Youth users of DASCs can access opportunities on the demand side
	Publish DASC Communication Briefs twice a year	Two DASC Communication Briefs pear annum	Knowledge sharing towards improved practice of DASC Managers and Leadership and among the DASC network

Table 10 suggests that the activities identified as small wins are specific, measurable, achievable, realistic and time-bound, or SMART. This approach is also based on low capital and variable costs and low risk, a further factor of achievability.

Achieving the outputs and outcomes indicated in the log frame will require support and guidance from a leadership team made up of DCDT, its partners and representatives of the DASC network.

Appendix A: Three case studies

The following provides an overview of three DASCs that served as in-depth case studies for the overall baseline study.

The case studies provide a narrative documented with photos (by the researcher carrying out the site visit) of the digital skills and digital access modalities at each of the DASCs. They include insights gleaned from youth users of the DASC resources and services and from a structured site visit to explore the nature of connectivity, digital infrastructure, digital skills services and prospects for financial sustainability of each centre.

Case study 1: LINDAMAHLE INNOVATION CENTRE

Lindamahle Innovation Centre is located in a rural area called Bizana in Mthatha, in the Eastern Cape. The centre's location can be found on its Facebook page and website. The centre opened on 8 July 2022, in partnership with Software AG, a German multinational software company that develops enterprise software for business process management, integration and big data analytics.

1.1 The surrounding environment

The centre is surrounded by villages. It is accessed via a short gravel road (less than 1 km) off R61 that was built specifically to serve the centre – the sign for the turnoff is easily missed. The bustle associated with inner city areas is visibly absent. The researcher saw no taxis, bus stops or street vendors, nor were there any shops or schools in the immediate vicinity.

The road to the centre was not easily travelled by an ordinary sedan. On the day of the site visit, workers were doing their best to clear the road for the visitors attending a graduation ceremony.

The road leading to Lindamahle Innovation Centre.

View from Lindamahle Innovation Centre looking out over the surrounding area.

Access to the centre grounds is through a black access gate, behind which dispersed dwellings were clearly visible (see photos above). Inside the centre, a free-standing tap could be seen in front of the building, in an open field that show no signs of being used for any activities.

Open field with tap.

The latrines were visible a bit further down from the building. There were two stand-alone structures: one for men and one for women. Each had two pit toilets but no sink. The latrines were relatively clean.

The toilets at Lindamahle Innovation Centre

An outdoor play area was equipped with a swing and a slide, but both were damaged at the time of the visit. The slide had only steps and the swing had no seats. The pictures below show people preparing for a function, setting up tents, mowing the grass and cleaning the ground.

The play area at Lindamahle Innovation Centre.

1.2 The centre

The centre proper appeared to be recently built. It was clean and neat, constructed in a minimalist design and style.


Various external views of Lindamahle Innovation Centre.

The building looked secure, as it had burglar bars on the windows and doors, and the laptops were stored in a safe room and secure cupboard, as shown in the photos below.



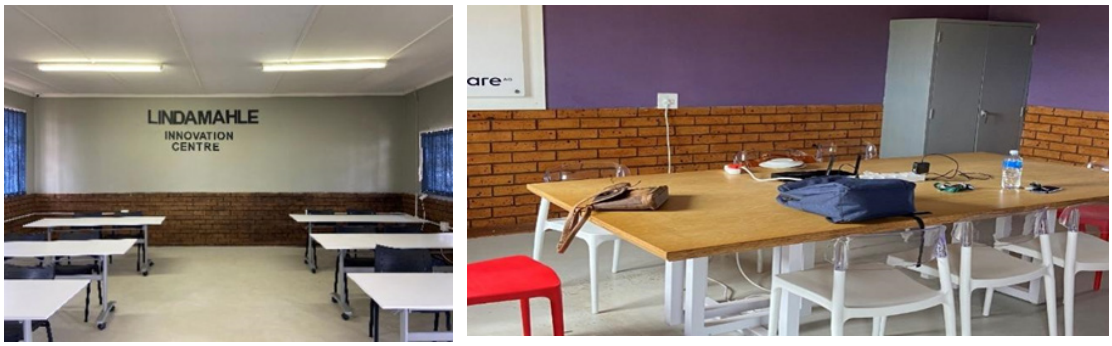
Secured building with burglar bars and a safe storage room.

1.3 Infrastructure

The centre was equipped with electrical outlets and lights. The lights were tested and were all in working order.

Electrical outlets and lighting.

The centre consisted of one building with three classrooms and a staff room that had a storage area. Two of the classrooms were equipped with two-person desks and chairs (see photo below); there were no posters on the walls, just two banners at the front of the classroom. The third classroom had a white board projector and a mix of round discussion tables and two-person desks; there was a banner and three glass posters of the different activities offered, e.g. coding, 3D printing, innovation, robotics. The laptops were kept in the storage room and only set up during classes.

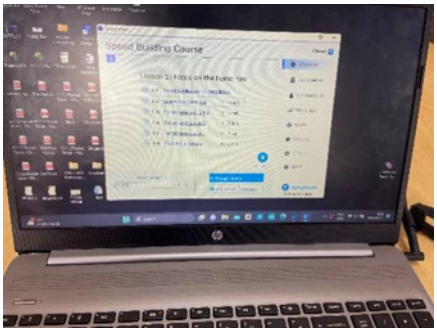


Furnished rooms.

1.4 Digital infrastructure

The centre was used primarily for digital skills training. It had laptops but no other accessories (e.g. mouse), and each laptop had a number. The laptops were not assigned to specific students and required no password; the desktop indicated various documents belonging to different people.

It took 3+ minutes to start the laptop. During the most recent session, the four learners who had remained behind to help explore the different applications took more than 5 minutes to start the laptop and ultimately opted to go to their gown fitting. They confirmed that it took a long time to start the laptops and that the configuration process was sometimes launched. They did not know how often the laptops were serviced but still experienced these issues.



Laptops and routers.

The MS Word and Excel documents used to test whether the laptops were in working order were workable. However, during the tests the researcher realized that the laptops had to be connected to the Internet to use them. The connection was quickly and easily established but the network kept cutting out; when that happened, the application stopped working and any unsaved work was lost. The students said that the AutoRecover function sometimes worked, but most of the time they had to start over.

1.5 Digital skills programmes

At the time of the study, Lindamahle Innovation Centre offered industry-recognized certification programmes in networking, programming and cybersecurity. Through its partnership with various entities, it had successfully delivered a 12-month programme for unemployed youth in rural Eastern Cape. The researchers and partners were able to attend the graduation ceremony in February 2024.

Graduation ceremony

DCDT, ITU, Cisco, Software AG, ILO, GIZ, media, the Information and Communication Technologies Sector Education and Training Authority, and NEMISA attended the graduation of the students from Lindamahle Innovation Centre in February 2024.

Of the 41 graduating students, 32 were unemployed young women and mothers from the surrounding community. They excelled in Networking Academy courses, achieving a 100 per cent pass rate and 96 per cent cum laude distinction, despite the challenging socio-economic conditions.

"These young women and our team at Lindamahle worked extremely hard to reach this important milestone for our community," said Zine Nkukwana, Lindamahle CEO.

Fifteen of the 41 young graduates of the 12-month Cisco Networking Academy course. The CEO of Lindamahle Innovation Centre can be seen centre front, the representatives of the partner organizations in the back row.

1.6 Operational model

Lindamahle Innovation Centre was operating as a non-profit company and had a board of directors. It was also linked to a for-profit company from which it had not yet been able to reap a sustainable income. At the time of the baseline study, the centre employed 10 staff, many of them as facilitators.

1.7 Youth user narratives

Twenty-one young people participated in the focus group discussion, which was conducted in IsiXhosa and English, because the students were very shy, reserved and nervous.

Youth participating in the focus group discussion.

Nature and extent of YNEET participation in digital skills training

All the participants come from different places; the majority were from the surrounding villages and some were from the two main towns, Mthatha and Engcobo. They attended classes at the centre two days a week but pointed out that they could also work and study at the centre on other days, including weekends. Some of the participants walked to the centre while others used public transport; the former was unsafe and the latter very costly, putting a crimp on the students' ability to attend. Every day, which included a lunch break, the participants attended different classes, both theoretical and practical. When the class involved practical work, the laptops were set up on the tables; during theory classes notes were handed out. The notes could also be accessed via the portal, allowing the participants to study at home, especially when they were unable to attend a class.

The digital skills courses that were run at the centre in 2022 and early 2023 were modules in the Cisco Networking Academy programme and covered mobile digital literacy, Microsoft literacy, cybersecurity and networking.

The participants had to complete all the modules to qualify for accreditation by the Cisco Networking Academy. They were divided into two groups, network management officers and community officers, and participation in each depended on which module the student had passed. The network management officers had taken the networking modules. They attended classes on Tuesdays and Wednesdays from 0830 to 1545, with a break at 1200. This group worked mainly with laptops, except during load shedding. The modules consisted of networking fundamentals and project management.

Willingness to pay and affordability

The courses were free of charge; only those travelling by public transport had to budget transportation. Two of the participants said that they had rented accommodation in a nearby village because they were from Mthatha and being closer to the centre helped maximize their participation.

The youth reported that they had gained skills in programming, computer use, research, writing (e-mail and CV) and design. They had also learned how to protect their personal information and obtained practical experience of the digital space.

None of the 21 participants were engaged in income-generating activities at the time of the discussion but all said that the centre had given them skills and knowledge. Twelve said that they had started at the centre not knowing how to operate a computer. The first time that they opened Microsoft Windows was at the centre. They now knew how to type and could help family members at home with their e-mail.

Some of the participants said that they could see themselves pursuing their IT studies independently because they had researched the different companies that hired people with the certificate they had earned. One of the participants had gone back to high school and was able to choose computer applications technology as a subject because she was familiar with it; she helped other students in the class. Most of the participants said that they saved money because they were no longer obliged to visit an Internet café.

At the time of the focus group discussion, not much had been done to extend digital skills training opportunities to YNEETs in rural areas. When people found out about the centre, they either attended or not. Some had criticized the programme: "It doesn't pay, why should I waste my time"; "It won't make a difference in my life"; and "It is the village, why would I want to study in a village?" For the participants in the focus group discussion, such comments were indicative of people's ignorance about how the centre operated.

When asked for suggestions to improve the centre's operations and enable it to become sustainable, the participants said that they were not given enough practical work. One participant who was interested in web development said that she had learned a great deal of theory but would value more practical work.

The participants also suggested that the younger children in the villages be exposed to digital skills development programmes on weekends and that online sessions could help those struggling to attend sessions physically because of the distance they needed to travel.

The participants were grateful for the skills they had learned, even though most of them had no idea how they would use them to earn an income. They had limited knowledge about what they could do besides work in IT; as suggested during the discussion, those that were not interested in IT had considered putting the skills they had learned at the centre to use in data capture and management, as filing clerks, in geographic information systems and in project management.

The researcher visiting the site proposed that a village-focused pop-up drive would be helpful for informing more people about the work done at the centre and the benefits of participating. Word of mouth did not seem to cover the activities at the centre thoroughly. As many students mentioned, they had arrived at the centre by chance – one thought he was going to be trained to operate a till! Only when they had started attending did they understand. The researcher further proposed that a career guidance session would also help the students navigate the different paths that they could take after the course, so that their time spent at Lindamahle was of benefit to them in the long run.

1.8 Partnerships model

Lindamahle Innovation Centre has established partnerships with a range of key governmental stakeholders, such as DCDT, and strategic Sector Education and Training Authorities, such as the Media, Information and Communication Technologies Sector Education and Training Authority. The latter plays a pivotal role in promoting skills development and economic growth in the subsectors for which it is responsible, namely advertising, film and electronic media, electronics, information technology and telecommunications.

The centre had also secured partnerships with the international development community (e.g. with ILO and GIZ, which support vocational training programmes adapted to labour market needs and offer their partners a wide range of services, methodologies and approaches). It had partnered with UNISA, one of South Africa's leading open distance-learning universities, and with private technology companies such as Cisco's Networking Academy, a global IT and cybersecurity education programme that partners with learning institutions around the world to empower all people with career opportunities. The centre is Cisco's largest and longest-running corporate social responsibility programme.

Moreover, the leadership at Lindamahle Innovation Centre had also established relationships with the traditional leaders in the communities, with the mayor's office and with the local municipality. During the interview, the founding CEO reported that she had engaged with the Department of Economic Cooperation and was championing relationships with a diverse array of partners so that the centre could consistently open pathways to sustainable livelihoods for young people.

1.9 Road to financial sustainability

According to the CEO, Lindamahle Innovation Centre had some distance to go to be financially sustainable. Presently it was still dependent on funding, albeit from a range of partners, and was not recovering all costs but still living "from hand to mouth". The cost structure described in the report (see section 8.4.1) reflects the centre's cost structure; the application of a total-cost-of-ownership model would help define the centre's financial needs and then develop its strategy for financial sustainability over a longer planning horizon.

Case study 2: MOSES KOTANE INSTITUTE CENTRE: NDWEDWE DIGITAL CENTRE

The Ndwedwe Digital Centre is in the centre of the Ndwedwe community, which is a peri-urban area. The centre is located 5 minutes from the local Boxer Supermarket and on the same premises as the local Department of Education Teacher Centre. Also known as the Maxwell Hadebe Digital Centre, the Ndwedwe Digital Centre was opened on 14 February 2020 as one of the series of digital centres established by the Moses Kotane Institute in various provinces.

2.1 Operational model

The Ndwedwe Digital Centre is one of 14 DASCs forming part of the Moses Kotane Institute in KwaZulu-Natal. According to the manager, the centre's primary mission is to empower the community through digital skills development and education: "Our vision is to provide the skills to the masses of the community, trying to breach the gap of unemployment and to help build their skills." This reflects a commitment to addressing the prevalent issue of unemployment by equipping individuals with the skills they need to secure employment or become entrepreneurs. The centre's focus on providing courses on subjects such as end-user computing, technical support and systems development reflects its dedication to enhancing the employability and livelihoods of young people within the community.

2.2 The surrounding environment

The Ndwedwe Digital Centre is located centrally in the town of Ndwedwe, along the P-100 Ndwedwe Main Road. This strategic location attracts various people, including those from surrounding townships who travel to the area for shopping and other basic needs. The busy surroundings are home to local municipal buildings and offices, where residents line up to seek various forms of assistance. Essential institutions, such as the local Home Affairs office, the Ndwedwe Local Municipality, the local police station and the magistrate's court, can all be found within a 1-k radius and contribute to the area's vibrancy.

Despite the busy surroundings, the Ndwedwe Digital Centre maintains a safe and secure environment for its students and staff. The centre is equipped with a single gate entrance, guarded by vigilant security guards. The quality steel fencing and sliding gate provide an added layer of security, ensuring the safety of everyone and their belongings within the premises. No external security cameras were observed during the visit, however.

The physical infrastructure of the Ndwedwe Digital Centre is modest yet functional. The centre shares a single room with the adjacent library and conference facilities. Within this space, 15 computers are available for student use, supplemented by a central printer located in the centre manager's section. While some wiring is exposed, it does not pose a significant risk to individuals. Moreover, the centre benefits from a fully operational air-conditioning system shared with the local library, enhancing the occupants' comfort. Outside the centre, well-maintained flush toilets, managed by library staff, are a convenience for users and contribute to a hygienic environment. Additionally, infrastructure for both satellite and Internet connectivity is visible inside and outside the centre, ensuring seamless access to digital resources.

Surrounding environment showing the location of the Ndwedwe public library, to which the Ndwedwe Digital Centre is linked.

2.3 Infrastructure

Despite being established in 2020, the infrastructure and facilities at the Ndwedwe Digital Centre were well maintained. The surrounding parking areas, mostly tarred and equipped with covered parking spaces, speak to the centre's thoughtful design and planning.

Inside, essential amenities like air conditioning remained intact, providing a comfortable learning environment for students. The tables and chairs were in good condition, an indication of regular upkeep and care.

Outside the centre, the designated areas for sitting and enjoying lunch were evidently well maintained and in good condition, as most of the people at the time of the site visit were using them during the lunch break. The building itself remained solid and intact, with its brick face exterior and well-maintained roofing contributing to its aesthetic appeal and structural integrity. In sum, while the Ndwedwe Digital Centre exhibited the signs of wear and tear typical of a four-year-old establishment, its overall condition reflected a commitment to upkeep and maintenance. Top of Form

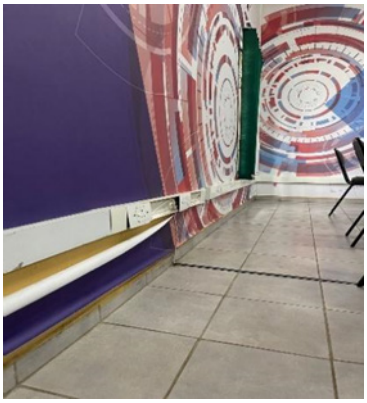
The centre premises (well-constructed building with air conditioning).

2.4 Digital infrastructure

The centre's 15 computers remained in good condition and were equipped with user-friendly software and applications. Students were exposed to all SoloLearn material for learning and enhancing their coding and digital skills. They also had access to the full Microsoft suite. One of the main activities was learning to code. All these applications took less than 5 seconds to open and function. The computers took an average of 1 to 2 minutes to start up.

During the site visit network connectivity worked efficiently, and Internet speed was above 100 Mbit/s. This speed level is crucial for accessing videos and downloading learning materials, as explained by the centre manager. One of the students demonstrated how quickly she was able to access the Google search engine and navigate to a specific website. Load shedding was the only factor halting Internet access, and the centre closed during the few hours of load shedding.

According to the centre manager, a significant challenge was ensuring consistent Internet connectivity, particularly during instances of load shedding: "There is a shortage of power supply at the centre. When there is no power, we tend to suffer." However, proactive strategies were being implemented to mitigate these challenges, such as monitoring load-shedding schedules and planning activities accordingly.



Digital infrastructure at the Ndwedwe Digital Centre, including a power device and connectivity access.

Inside the Ndwedwe public library adjacent to the centre.

2.5 Digital skills services

The Ndwedwe Digital Centre is used primarily as a digital education and skills training centre. It hosts and facilitates a wide range of basic to advanced digital skills programmes, from basic digital literacy to more advanced coding and 4IR-related programmes of varying duration. These programmes are certified by digital companies such as Microsoft. The young people who register are between 18 and 35 years old and are enrolled in a structured programme that allows them to be exposed to training and mentorship. The centre facilities and activities are only open to enrolled youth.

2.6 Youth user narratives

A focus group discussion was held with 15 youth participants in the centre's digital skills programmes. The participants highlighted the centre's role in providing access to information and learning opportunities, particularly in enhancing digital skills. There were limited opportunities to access computers and the Internet in Ndwedwe, which had only one known Internet café that offered Internet access, at a cost. The participants expressed gratitude for the centre, emphasizing its role in facilitating learning, job applications, research and personal development.

The centre's provision of free Internet access and computer resources enabled individuals to acquire knowledge, apply for jobs, pursue further studies and even engage in entrepreneurial activities such as selling goods online. One of the participating students said, "We are grateful to get this place. Nowadays, we need access to the Internet, and we are responsible enough to put it to good use."

This highlights the participants' appreciation for access to the centre's resources, in particular its role in providing access to information and highly valued learning opportunities. This sentiment was echoed by all the participants, who viewed the centre as a valuable resource for personal and professional growth, enabling them to overcome barriers to education and employment.

Another theme that emerged was the pervasive challenge of unemployment among young people in the community of Ndwedwe. The participants shared their experiences of struggling to secure employment despite obtaining qualifications, and generally agreed that the centre had helped them find work opportunities online. They highlighted the limited access to tertiary education, often due to programme capacity constraints and a lack of resources.

Four participants said how important it would be for the centre to expand its resources to other young people, in order to have more people in the community exposed to online opportunities. Many expressed frustration at the disconnect between their qualifications and job opportunities, emphasizing the need for practical skills development and employment support services. They agreed that the certificate they received on completing the programme did not carry enough credibility to help them get jobs.

The participants discussed the impact of free Internet access on their ability to seek opportunities and address unemployment challenges. They described using the Internet for various purposes, including to look for work, apply to universities, conduct research and promote entrepreneurial ventures. Free Internet access was perceived as essential for maximizing opportunities and overcoming financial barriers to information access. However, concerns were raised about the

sustainability of free services and the need for community contributions to ensure the centre's long-term viability.

The discussion highlighted the importance of community engagement and support in leveraging the resources provided by the centre. The participants expressed appreciation for the centre's inclusive and supportive environment, where they could access guidance and assistance from the centre manager. They emphasized the centre's role in fostering collaboration, knowledge-sharing and skill building within the community. They also discussed the need for collective action to sustain the centre's operations and ensure its continued impact on community development.

2.7 Sustainability of the centre

The centre relied on external funders, such as Enterprise iLembe and the Moses Kotane Institute, to sustain Internet access; in other words, it was dependent on external support for operational continuity.

The participants reflected on the importance of sustainability and long-term planning for the centre's success. They acknowledged the challenges associated with relying solely on government funding and advocated community involvement in resource mobilization and centre management. The discussions revolved around potential strategies for generating revenue, such as charging nominal fees for certain services like printing, while maintaining free access to essential resources like Internet connectivity. The participants emphasized the need for a collective mindset focused on investing in the centre's future, to support ongoing community empowerment and development efforts.

During the discussion, one participant stated, "It is a fact that at some stage funds run dry, so can you think bigger than your own challenge, to say if you were to sustain things around your community, what are the things that you need to look for." It was suggested that, beyond the grant from the Moses Kotane Institute, the centre's sustainability would require an access fee from the service users. Some of the participants objected to that suggestion, citing financial constraints.

The centre's sustainability was facilitated by a collaborative approach involving knowledge-sharing and resource pooling between different centres. The manager emphasized the importance of gathering information from other centres, sharing knowledge and implementing successful strategies. This collaborative model enabled the centre to continually evolve and expand its programmes, contributing to its long-term sustainability.

According to the researcher who conducted the site visit, to ensure its sustainability, the centre will need to seek diverse funding sources and find innovative solutions to improve Internet access, especially during power outages. Moreover, building partnerships with local businesses and organizations could help create job opportunities for the youth.

Case study 3: VEXOSPARK DIGITAL COLLEGE

Vexospark Digital College is located in a rural area, Lenyenye in Tzaneen, between Limpopo Polokwane (1h45 minutes away) and Tzaneen town (30 minutes away) on the R71 route. The location of the centre can be found on Google Maps. The centre was officially registered in 2016.

3.1 The surrounding environment

Vexospark Digital College is surrounded by villages and located not far from a tarred road (R71). The road leading to the centre is also tarred but has many potholes. It also has a taxi/bus stop area and street vendors. There were shops across the street near the centre and Lenyenye primary school is located opposite.

The centre building was surrounded by beautiful flowers and little trees, very fresh, neat and clean. The building looked secure, as it had burglar bars on windows and doors, and laptops were kept in a safe storage locker (see photos). It had a Letaba Wi-Fi router for Internet access. The laptops were in good condition and comfortable to use.

Vexospark Digital College: surrounding environment.

3.2 Infrastructure

Vexospark Digital College was secured by steel barbed wire running horizontally. There was a guard house next to the gate and visitors were signed in by the security guard, who also checked all bags. The centre had an alarm system (see photos).

The college consisted of a C-shaped block with three classrooms for digital literacy, a reception room, a storage area, a kitchen, and toilets for men and women.

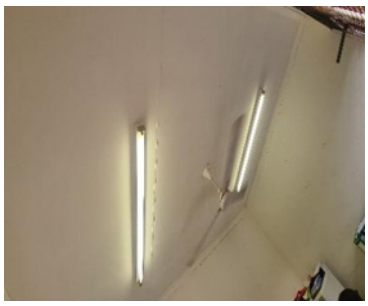
Building infrastructure.

3.3 Digital infrastructure

Two classrooms were set up with desktop computers and chairs, and were used as computer labs, with banners posted at the front. The college did not have a projector but did have an "Internet café". The laptops were given to students in the reception room.

The college had desktops, laptops and other accessories (e.g. mouse and keyboards). Laptops were not assigned to a specific learner. No passwords were needed and the desktop had various documents created by different people.

It took about four minutes for the desktops and laptops to start the Windows operating system. The MS Word document and Excel documents used to test them worked well.



Digital infrastructure.

3.4 Digital skills services

The college is used only for digital skills training. All the participants in the focus group discussion came from different places (a majority from the surrounding villages) and attended 5 days a week, for approximately 15 hours per week. Some walked to the college and others used public transport. Attendance could be limited by the fact that it was not safe to walk from more distant villages. The classes covered theory and practical work; the laptops were always set up on the tables and notes handed out for theoretical instruction.

The programmes run at the college between 2022 and 2024 included Microsoft literacy, cybersecurity, networks and She Connect. The participants had not yet completed all the programmes. They worked mainly with the laptops, except during periods of load shedding.

3.5 Youth user narratives

Thirty-two participants took part in the focus group discussion, which was conducted in English and Sepedi. English was chosen to ensure easy and accurate transcription of data. The team-building activity before the discussion helped improve interaction between the participants and encouraged them to speak more freely during the discussion.

Youth participating in the focus group discussion.

According to the participants, the digital skills training had led to skills, income and livelihood gains.

Skills learned: coding and robotics, computer use, research, writing (e-mail and CV), design, troubleshooting and networking.

Livelihood gains: knowledge, how to protect personal information and practical experience of the digital space, and how to make money from the skills learned.

One student indicated that he was making money by uploading content to YouTube; the more "likes" he had, the more he made. Over 70 per cent of the students had started at the college not even knowing how to operate a computer. They now knew enough about troubleshooting to detect and replace faulty components. Most had saved money because they no longer needed to go to the Internet café.

Willingness to pay

The participants paid no fees for the classes; only those traveling by public transport had to budget accordingly. Six of the participants said that they had rented accommodation in a nearby village because they were from Ga-Matlala and it helped to be closer to the college to maximize their participation. Two stated that they also used the monthly government stipend of ZAR 350 to help cover costs and another two said that they worked at a salon after attending the classes.

It was suggested that participants should pay ZAR 100 to the college, to offset the costs incurred by their attendance and ensure the college's sustainability. It was also suggested that they could help by cleaning the premises, allowing the college to redirect funds towards buying computers/laptop and increasing the Internet connectivity speed.

One of the participants suggested that the young men participating should help fix the broken tables, to secure the desktop computers. The suggestion also provided insight into gender issues and led to greater awareness that women and girls could also use computers and do computer repair work.

3.6 Partnerships and sustainability

Vexospark Digital College drew inspiration from the Siyafunda Community Technology Centre in Katlehong Gauteng, which had been established in 2012 and had provided the college with technical guidance. The college manager had also championed its establishment and was developing wide-ranging partnerships in an attempt to sustain its work over the long term. Some of the partners' logos are visible in the photo below.

Logos of partners.

The college manager expressed interest in a total-cost-of-ownership structure, as the college was currently run on a shoestring budget. The manager also expressed interest in learning more from centres across South Africa and in engaging in strategies for putting the college on a financially sustainable footing.

Appendix B: RESEARCH QUESTIONNAIRE

The primary research questions that guided the study on RTCs and the involvement of YNEETs in DASCs were:

What is the nature of the sustainable connectivity models and digital skills and capacity building strategies at DASCs and how responsive are they to the skills, employability and livelihoods needs of YNEETs in context?

What measures need to be sustained, improved, introduced, and strengthened to increase sustainable access and use of digital technologies for YNEET in rural South Africa for meaningful training and jobs.

The following subquestions relate to current realities and proposed strategies to advance innovative sustainable connectivity solutions and digital skills development strategies for widespread impact on the YNEET population in rural areas.

1. What are the essential elements for a sustainable digital skills connectivity operating model across various types of digital centres in South Africa?
2. What are the sustainable financing approaches applied to support meaningful connectivity at DASCs?
3. How responsive are RTCs to the connectivity access, digital resources, skills and livelihood needs of YNEETs in their communities?
4. What are the most salient lessons that can be learned from the experience of DASCs across a spectrum of contexts about sustainable connectivity models and digital skills development strategies for YNEETs?
5. How can DASCs be placed on a sustainability trajectory based on the model of connectivity sustainability that emerges from this study?
6. What business model strategies can be recommended based on market assessments, to advance the sustainability of the connectivity models and digital skills strategies to support YNEETs at DASCs across a range of rural contexts?
7. Drawing from analysis above, literature review, benchmark practices among others what are the proposed recommendations for enabling reliable and affordable connectivity for YNEETs in rural communities?
8. How can implementation and financing plans at DASCs be developed to support and enable a sustainable trajectory in relation to meaningful connectivity and digital skills development for YNEETs?

Appendix C: SEMI-STRUCTURED INTERVIEW QUESTIONS

Following brief introductions, and explaining the purpose and objectives of this study, check if the interviewee gives consent for the interview to be conducted and for it to be recorded.

Explain that this is **one interview** and that there is also **an online questionnaire** which we would like the respondent to answer.

Explain that in **this interview**, the following themes will be covered:

1 Background to the Centre
2 The Centre's Business Model under the following themes

   a) Its Operational Model
   b) Its Connectivity Model
   c) Its Digital Skills and Employability Offerings to YNEETs
   d) Its Funding and Financing Model

Discuss the possibility of **a focus group discussion with youth who use the Centre's services.**

SECTION 1: BACKGROUND INFORMATION ABOUT YOUR CENTRE

1 OPERATING MODEL: Please can you explain the history of your Centre, when was it established, its vision, mission and goals?
2 How is your Centre is structured, managed and governed including how many staff you have in total including full time, part time, casual staff.
3 Can you please describe the role that you play at your Centre?

SECTION 2: CONNECTIVITY ACCESS FOR YNEETS

4 Can you tell me more about the Internet connectivity access solution that you provide at your Centre.

Ask follow-up questions based on respondent's response including questions about innovative connectivity solutions that may be on offer

5 Can you tell me more about the users of Internet access and digital services that you offer at your Centre?

Follow up questions:

What proportion are youth?

What proportion are YNEETs?

What kind of services do the YNEETs make use of at your Centre?

6 Do you charge Youth who are Not in Employment, Education or Training (YNEETs) to access the Internet at your Centre? If so, please explain your charge rates for Internet access, digital services, participation in employability training programmes.

Follow up question: what is your experience with YNEETs paying for the services that are offered at your Centre? Do they pay in full. Are they subsidised? By whom?

7 What are your Centre's biggest challenges with providing Internet connectivity access to YNEETs? How did you overcome these challenges to sustaining connectivity access to YNEETs at your Centre?

8 What strategies are you employing to sustain connectivity access for YNEETs at your Centre over a long period of time?

SECTION 3: DIGITAL SKILLS & EMPLOYABILITY FOR YNEETS

9 Please can you tell me more about the kind of programmes that you offer YNEETs at you Centre. I am particularly interested in the digital skills training programmes and employability and livelihood skills programmes that you may offer YNEETs.

Ask follow-up questions based on respondent's response including questions about YNEET responses to these programmes and whether they have made a difference in their lives and livelihood.

SECTION 4: CENTRE SUSTAINABILITY & BUSINESS MODELS

10 How have you been able to sustain the running of your Centre over time, to be able to deliver connectivity access and digital skills services to YNEETs?

11 Can you describe your Centre's financial sustainability/ business model?

- a What is the Centre's funding structure
- b How does the Centre mobilise resources?

c What are the centre's main capital and operational costs?

12 Tell me more about the ways your Centre has been able to overcome financial sustainability challenges?

Ask follow-up questions based on respondent's response including questions about resource mobilisation strategies, partnerships and sustainability.

13 Are there any questions or concerns that you wish to ask or raise about issues related to your Centre's connectivity access models, digital and employability skills programmes for YNEETs or its financial sustainability?

INTERVIEW NO 2

SECTION 1: SUSTAINABLE BUSINESS MODELS

1 I kindly ask if you can explain your Centre's business model to me in more detail. First can we talk more about your Centre's cost structure in terms of providing Internet connectivity. What are the most salient capital and operational costs for making Internet connectivity available and accessible to your clients?

2 Can you explain the costs involved in designing and delivering digital skills programmes at your Centre?

Ask follow-up questions based on respondent's response

3 Can you tell me more about your Centre's income streams. What are your top 5 main income streams and do the operational costs of the Centre users of Internet access and digital services that you offer at your Centre?

4 What are your top three most critical challenges with your current business model and what are your strategies to engage with these challenges?

5 Tell me more about your Centre's resource mobilisation, partnership and fund-raising strategies.

Ask follow up questions based on respondents specific responses and delve deeper on business model and sustainability strategies.

SECTION 2: SUSTAINABLE AND INNOVATIVE CONNECTIVITY SOLUTIONS

6 Has your centre explored new and innovative ways to make connectivity accessible to YNEETs? If so, please explain your approaches to sustainable connectivity innovation for YNEETs and under-served communities

7 What are our top three challenges in sustaining connectivity access to under-serviced communities and YNEETs?

8 Name two strategies that have been successful on your Centre's path toward providing sustainable access to connectivity for YNEETs and why they have been successful.

SECTION 3: DIGITAL SKILLS & EMPLOYABILITY FOR YNEETS

9 When have your digital skills programmes for YNEETs been most successful? Can you provide at least two stories of success with YNEET digital skills development and why they have been successful.

10 What are your most enduring challenges with providing digital skills training to YNEETs in your area and how have you overcome them.

Ask follow-up questions based on respondent's response including questions about YNEET responses to these programmes and whether they have made a difference in their lives and livelihood.

Appendix D: FOCUS GROUP DISCUSSION WITH YOUTH USERS. A GUIDE

Date: 13 December 2023

Time: 10:00 – 11:30

Modality: Virtual

Participants: There will be 10 youth participants who have engaged in digital skills programmes at VexoSpark Digital College and its network of centres in Limpopo and Eastern Cape. Five participants will be part of their alumni network of youth who have completed courses. The other five are part of existing, current cohort and one of the youth is a regular user. Five youth participants will be women and five will be men.

Study Intent: Exploring Sustainable Connectivity Models in support of broadening Digital Skilling Access Opportunities for YNEET in Rural and Underserved Communities in South Africa.

Goal: The goal of the focus group discussions (FGD) is to get an in-depth understanding of the experiences, perspectives and sentiments of young people about rural based technology and digital skills development centres (RTDSCs) and their recommendations towards strengthening sustainability of these centres.

Aims: The aim of the YNEET FGD is to convene young people and facilitate a discussion about their experiences with the Vexospark Digital College and its network and how these centres could be strengthened to operate in a sustainable way.

To test market viability of a proposed implementation and financing models for increasing access and use of digital technologies for YNEET in rural South Africa for meaningful training and jobs.

Objectives: The objective of the YNEET FGD, aligned with the research study aims are:

- To engage with YNEET about their levels of connectivity access, including in relation to their use of the RTDSCs for access to digital resources
- To ascertain:
    - the extent to which YNEETs pay for digital services at the RTDCs and beyond
    - the affordability of YNEETs to pay for digital services at RTDCs and beyond
    - the nature and extent to which YNEETs participate in digital skills training programmes at their local RTDSCs.
    - whether the digital skills training programmes they have participated in, have led to skills, income and livelihood gains
    - obtain feedback regarding access and business models in support of extending digital skills training opportunities to YNNETs in rural areas
    - obtain feedback regarding proposed recommendations on financing / business / technical models as may be applicable for strengthening sustainability of community access training/ innovation/ information centres in rural communities
    - obtain feedback regarding practical quick win solutions to be implemented in support of strengthening sustainability of community access training/ innovation/ information centres in rural communities.

Intended Outcome: The intended outcome of the YNEET FGD is that the research study has obtained insights on YNEET experiences and views from their perspective, in their voices related to sustainability strategies for connectivity and digital skills training at RTDCs.

Agenda: The agenda for the FGD includes the following items

Time	Topic	Objective
10:00 – 10:05	**Opening and Welcome**	• Deliver opening remarks • Welcome participants • Introduce focused group facilitator
10:05 – 10.10	**Scene Setting and Focused Group Procedures** Ice breaker activity: Tell us how you are feeling right now	• Introduce objectives and outcomes • Explain Focused Group Procedures and obtain Informed Consent • Pose ice-breaker question
10:10 – 10:30	**Exploratory Theme 1: Background of YNEET Participants** **Exploratory Theme 2** **Sustainable Connectivity Models**	• Present thematic statement and questions • Participants answer to questions such as what, why and how regarding the thematic topic • Facilitation of a discussion around enabling reliable and affordable connectivity for YNEET in the rural communities
10:30 – 10:50	**Exploratory Theme 3** **Digital Skills Training Services**	• Present thematic statement and questions • Participants answer to questions such as what, why and how regarding the thematic topic • Facilitation of a discussion to assess the willingness to pay or level of affordability for digital services as well as access, usage pattern for YNEET in townships, rural, remote, and underserved communities
11:00 – 11:15	**Exploratory Theme 4** **Sustainable Business Models**	• present thematic statement and questions • participants answer to questions such as what, why and how regarding the thematic topic • facilitation of a discussion on financing / business / technical models as may be applicable for strengthening sustainability of community access training
11:15 – 11:20	**Final poll**	• Participants answer to questions posed through a live poll to provide additional guidance on how related interventions in rural communities can be scaled sustainably
11:20 – 11:30	**Sum up and Closure**	

Facilitation Approach

The following facilitation approach includes an outline of the role of three interviewers – the independent researcher, DCDT and ITU representatives

Below is a list of ideal questions that align with the research objectives and intended outcomes. The most critical of each section is colour coded in RED.

Discussion Flow

1 Chair opens discussion, thanks participants for their interest and participation in the research project briefly introduces the interview panel and invites welcoming remarks.
2 Chair briefly explains the background and purpose of the study and thank participants again for joining the focus group.
3 Chair checks everyone consents to participation and for the discussion to be recorded.
4 Chair reminds participants that that they reserve the right to withdraw at any time and they have the right to refuse to answer a question as well. Remind them that we will not be asking personal information and that they will remain anonymous. Following consent, start recording.
5 **Interview questions will follow as assigned to three interviewers explained below:**

Note to Interviewers: The following questions are structured in accordance with the main themes of the study's conceptual framework and draws on the literature related to focus group discussion methodology with youth in contexts of disadvantage, marginalisation and exclusion when interviewers are from contexts that are not the same or similar to the contexts of the interviewees.

SECTION 1: BACKGROUND

1 Please can each of you introduce yourselves briefly, tell us a bit about yourself, how old you are, where you are staying and what you are doing for a living at present?

2 Can each of you tell us about your employment status is, If you are not yet in employment how long have you not been in employment?

3 What are your top two challenges that your face as a young person in your current employment/unemployment status?

Each person to answer this question

SECTION 2: USE OF RTDC CONNECTIVITY SERVICES

4 How do each of you make use of the RTDSC Centre in your area?

5 Do you use this Centre to gain access to the Internet? If so, how often do you make use of the Internet at the Centre? – [even if at least 3 answers for about 1-2 minutes each]

6 Do you pay to use the Internet at the Centre? If so, how much do you pay? – [we know from interviews already that they do not pay so this question is optional and serve as a verification question]

7 If the Centre had to charge for Internet access - like at an Internet Café, how much do you think young people like you would be willing to pay?

Probe further if there is time:

- For how long – how many minutes?
- For what capacity?
- For what amount of bandwidth?
- For what activities? Education vs entertainment
- How should the café be set up?
- And paying for digital skills training?

8 How were you able to afford it? How were you able to pay for it? Did you get support from another source to help you pay?

9 Are there any other ways in which you can access the Internet other than using the Centre? If so, tell me more about this.

SECTION 3: USE OF RTDC DIGITAL SKILLS TRAINING SERVICES

10 Have any of you participated in digital skills training programmes at the Centre? If so, tell me more about these programmes. What did it cover, what did you learn, did you find them helpful?

11 Did the digital skills training programmes help you with applying for jobs or gaining an income? Tell me more about this. How have they been helpful?

12 Have any of the digital skills training programmes not been helpful? If so, how have they not been helpful?

13 Did you pay for the digital skills training? If so, how much did you pay?

14 Were you able to afford the cost of the training at the Centre? How were you able to afford it. How were you able to pay for it. Did you get support from another source to help you pay?

15 Do you have suggestions on how the Centre can support your skills development better? If so, what would they be?

16 Do you have any questions to ask me?

SECTION 4: SUSTAINBLE BUSINESS MODELS

Note to Interviewer: Preface questions with the following explanation:

Many Centres like this one are funded by Government or Donor Partners. If this approach continues, funding money tends to run out eventually and the Centres may not be able to survive beyond that even though the services they offer are so important to young people like yourselves. Can you give us advice on ways in which this Centre can support young people and raise finances so that it can be self-reliant and not dependent on funding.

17 What if the cost of using the Internet for say, an hour or 2 hours at the Centre is partially supported (subsidised) by a sponsor or bank and part of it is covered through affordable charging. So instead of paying R10.00 an hour you pay R5.00 an hour for instance because the other R5.00 is sponsored by a donor partner or company. Do you think young people like

yourself will be prepared to pay for Internet access and use of the Centre's resources in this way?

18 Some Centres charge a subsidized rate for their digital skills programmes. The sponsor covers half of the cost, but the rest of the cost is covered through affordable charging on a scale of affordability. For example, you are given the option to pay what you can afford, and the Centre offers an additional service if you pay more, like assist with introducing you to companies, help you refine your CV and so on. Do you think young people like yourselves will be prepared to make this kind of investment in their skills development?

19 Some Centres have developed a list of individual sponsors in their communities to support young people on their skills development journeys individually and in groups. These sponsors need not provide money support but make their time available to mentor and coach young people on their journey towards sustaining their livelihoods. Have you had experience of this, and would you suggest this as a route for this Centre to take?

20 How could the centre reach more young people?

21 Do you have ideas and suggestions on what can be done for the Centre to offer Internet access, digital skills training and related activities over a long period of time in a way that can be affordable and payable by young people like yourselves?

22 Do you have suggestions on the role you can each play to help the Centre become less dependent on funders and run in a way that it can be self-sufficient and sustainable over a long period of time?

Possible additional questions depending on the flow of the conversation

- How do you relate to youth unemployment challenge?
- What is the relevance of digital skills in your life?
- Why did you register for the digital skills course?
- How far is the digital skills centre from where you stay?
- How do you get to the digital skills training centre?
- What does it take for you to attend the digital skills training classes?
- What are the barriers to accessing digital skills opportunities?
- What are the enablers that support access to digital skills opportunities?
- How have you experienced online training? What worked or did not work for you?
- What are your proposed recommendations for enabling reliable and affordable connectivity for YNEET in the rural communities?

Chair thanks all participants and interviewers and brings discussion to a close.

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ISBN: 978-92-61-39801-9

9 789261 398019

Published in Switzerland
Geneva, 2025