Digital Interventions

Technical Report for the Youth Employment in Sub-Saharan Africa Toolkit



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Technical reports are intervention-specific summaries based on a review of relevant studies from sub-Saharan Africa contained in the Youth Employment Evidence and Gap Map (EGM). This report is prepared by Varsha Nair, Campbell South Asia, and Howard White, The Research and Evaluation Centre. The meta-analysis was performed by Nina dela Cruz, Centre for Evidence-Based Social Sciences, Lanzhou University.

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About this technical report

This technical report is one of a series of technical reports being produced to document the evidence base for interventions to increase youth skills and employment in sub-Saharan Africa. The report is based on a review of relevant studies from sub-Saharan Africa contained in the Youth Employment Evidence and Gap Map (EGM).

The purpose of this report is to inform the content of the What Works for Youth Employment in sub-Saharan Africa Toolkit. This report provides results from both the quantitative evidence from impact evaluations and the qualitative evidence from process evaluations. The former are the basis for the effectiveness rating and the latter the lessons from implementation. The critical appraisal of the studies, which was undertaken for the EGM, provides the basis for the confidence in study findings.

Table of contents

About this technical report2
List of tables4
List of figures4
Abbreviations5
Plain language summary7
What are digital interventions?9
How are digital intervention programmes expected to work?11
What are examples of digital intervention programmes in sub-Saharan Africa?12
What has been the implementataion experience of digital intervention programmes?17
The effects of digital interventions20
Cost analysis24
Implications of study findings25
References
Annex 1 Results of meta-analysis
Annex 2 Calculation of meaningful effect sizes34
Annex 3 Critical appraisal

List of tables

Table 1: Examples of digital intervention programmes	.12
Table 2: Studies of digital intervention programmes in sub-Saharan Africa	.20
Table A2.1: 2x2 table to calculate percentage change in employment	.35
Table A3.1: Critical appraisal of included studies	36
Table A3.2: Threshold values for critical appraisal	37

List of figures

Figure A1.1: Effect of digital interventions on youth employment	31
Figure A1.2: Effect of digital interventions on business job offers	.32
Figure A1.3: Effect of digital interventions on material well-being	.32
Figure A1.4: Effect of digital interventions on programme attendance	33
Figure A1.5: Effect of digital interventions on income	.33
Figure A1.6: Effect of digital interventions on psychological well-being	34
Figure A1.7: Effect of digital interventions on youth skills	.34

Abbreviations

ACWICT	African Centre for Women, Information and Communication Technology		
BDS	Business Development Services		
BPO	Business Processing Outsourcing		
CAPS	Career and Placement Service		
CV	Curriculum Vitae		
EDC	Education Development Center		
EGM	Evidence and Gap Map		
EPAG	Economic Empowerment of Adolescent Girls and Young Women		
GIP	The Graduate Internship Programme		
ΙΑΙ	Interactive Audio Instruction		
ІСТ	Information and Communication Technology		
INGO	International non-government organisations		
IOM	International Organisation for Migration		
NAACAM	National Association of Automotive Component and Allied Manufacturers		
NGO	Non-government organisations		
PAJE-NIETA	Projet d'Appui aux Jeunes Entrepreneurs		
РоС	Protection of Civilian Site		
SABI	Sierra Leone Agricultural Business Initiative		
SamaDC	Sama's Delivery Centre		
SPDC	Shell Petroleum Development Corporation		
SYLP	Somali Youth Livelihoods Program		
TVET	Technical and Vocational Education and Training		

UNDP United Nations Development Programme

- USAID The United States Agency for International Development
- YEAVCD Youth Empowerment through Agricultural and Value Chain Development
- YEEP Youth Employment and Empowerment Programme

Plain language summary

What is this report about?	This report presents the finding from evaluations in English of youth employment interventions in sub-Saharan Africa which use digital technology.			
What are digital intervention programmes?	Digital interventions are programmes that make use of digital technology to enhance employment opportunities for people. Use of digital software, reliance on computers and mobile technologies, and promotion of skills pertaining to digital technology can make job search easier or open up new avenues for employment. A wide range of activities fall within the definition of digital interventions namely,			
	 i. digital skills training ii. job search and matching iii. digital platforms and iv. improving connectivity 			
In what context are digital intervention programmes implemented?	 Digital skills training interventions are often conducted in classroom based and university-based settings. Digital apps and community ICT facilities which are in used in community settings. Mostly they are implemented as a component within a larger programme. 			
What are the main design choices?	Design choices include: the nature of the digital component, who will implement it, what partners to work with, and the duration of the intervention.			
How are digital interventions expected to work?	How digital interventions increase youth employment depends on their purpose. Digital skills training increase employability of young people by providing them with the skills valued by employers and essential to the industry. Strengthening the capacities of training institutions in using digital technology improves their ability to train youth. Online job searching and applications process opens a wider pool of opportunities for jobseekers and candidates for employers. Digital platforms can also function as a medium to bring together young people, employers, government, industry experts and so on. Improving access to digital technology opens up the above opportunities for young people: online instructional materials, developing information and communication technology (ICT) skills, and job search and online applications.			
What sort of activities do digital	There are diverse digital skills interventions so they cover different activities which include training, assisting job search, and providing access to online resources.			

skills programmes support?	
Implementation issues	The major implementation issues identified are technological challenges, time spent on building the technical know-how of trainers and youth, as well as equipment procurement and maintenance issues. Programmes benefitted greatly from partnerships with industry experts and service providers.
The effects of digital interventions	The data on digital interventions programmes is limited, as most such interventions are usually combined with larger existing programmes or form a small component of it. Overall, there is greater likelihood of finding a job and a rise in wages through digital interventions. Although gender differentiated data is minimal, there is indication that women are more likely to opt for digital training programmes. There is low confidence in these findings on account of the small number of studies.
	matching more efficient by linking youth to jobs more in line with their interests. These were also able to generate more interest among youth due to the expanding digital and technology industry. There is high confidence in these findings.
Cost analysis	It is difficult to provide a comparative cost analysis of the programmes due to highly different settings and nature of programmes.
How strong is the evidence base?	The effectiveness and implementation evidence in this report is based on 8 impact evaluations and 11 process evaluations respectively. Critical appraisal of the studies indicate that the overall confidence in study findings is low for impact evaluations and high for process evaluations.
Implications for research	The evidence base needs to be built especially with more impact evaluations as well as process evaluation that focus closely on digital interventions and their effect on young people.
Implications for policy and practice	Ownership of digital technology such as mobiles and computers is very low in sub-Saharan Africa. Hence, there needs to be a plan to facilitate better access. Strategy to procure and maintain digital technology is key. Online training needs to consider difficulties such as conflict settings, load shedding and unstable internet while designing programmes.

What are digital interventions?

Digital interventions are programmes that make use of digital technology to enhance employment opportunities for people. Use of digital software, reliance on computers and mobile technologies, and promotion of skills pertaining to digital technology can often make job search easier or open up new avenues for employment. A wide range of activities falls within the definition of digital interventions. In this report we classify these into four categories:

- Digital skills training: Training in digital skills is often labelled Information and Communication Technologies (ICT). For example, in Kenya's *Ninaweza project* young women received 150 hours of training in ICT, which included "lessons ranging from how to manage files and folders; to how to make, edit and share digital videos; to how to set up a computer network" (De Azevedo, 2013: p,11)
- Job search and matching: Digital technology is used to assist either the job search process or the matching of employer to employee. An example of the former is Wheeler's (2019) study of the effects of a training to use LinkedIn, and the latter is the matching algorithm used to match job seekers to employers at a job fair in Ethiopia (Abebe et al., 2017).
- 3. Digital platforms: Online infrastructure is used as an information source, either serving instructional purposes or aiding job search. *The Youth Connekt Zimbabwe project* provided an online youth portal to facilitate information sharing among young people and promote engagement with a diverse group of stakeholders. The project also set up a *Connekt* e-store where young people could market goods and services (UNDP, 2023). *Automotive Training and Re-Skilling in the Post-COVID Economic Recovery for Vulnerable Youth and Women in South Africa* connected youth to the automotive industry and relevant job opportunities (UNDP, 2022).
- 4. **Improving connectivity**: Improving access to online resources. The *Youth Empowerment through Agricultural and Value Chain Development (YEAVCD)* project

in South Sudan created five i-Hubs which provided computers with internet access. The i-Hubs also provided training including career counselling and guidance by assisting in CV creation, helping with interview techniques and offering mentorship in entrepreneurship skill development and business services (Kimote, 2023).

How are digital intervention programmes expected to work?

How digital interventions increase youth employment depends on their purpose. For example:

- Digital skills training increases the employability of young people by providing them with skills valued by employers. Some degree of digital skills is generally required for working in the growing market for international outsourcing of business services.
- Strengthening the capacities of training institutions in incorporating digital technology enhances their ability to train youth.
- Online job searching and suitable online applications opens a wider pool of opportunities for jobseekers, enabling them to find job opportunities that are in line with their interests and strengths. Online interviewing broadens the pool of candidates.
- Digital platforms can also function as a medium to bring together young people, employers, government, industry experts and so on. It can operate as a place of knowledge sharing and discussions related to job search. Improving access to digital technology opens up the above opportunities for young people: online instructional materials, developing ICT skills, and job search and online applications.

What are examples of digital intervention programmes in sub-Saharan Africa?

Of the eight impact evaluations included in this report, five are Technical and Vocational Education and Training (TVET) based digital skills interventions while three are job searching or job matching interventions. Eleven process evaluations are included which are predominantly about TVET digital interventions. The programmes are spread across Nigeria, Kenya, Ethiopia, Sierre Leone, South Africa, Niger-Delta region, Uganda, Sudan, Mali, Somalia, Guinea, Zimbabwe and South Sudan.

Digital skills training was usually combined with life skills training and other programmes focused on developing vocational skills. There are few standalone digital interventions.

The interventions varied in their focus. While some provided training in digital skills and use of digital technology, others made use of digital platforms and portals to enhance job search and employment opportunities.

Further details of the individual projects are given in Table 1.

Table 1: Examples of digital intervention programmes

Economic Empowerment of Adolescent Girls and Young Women (EPAG) in Liberia included a classroom-based technical training, followed by a transition phase in which participants were provided the support to move into wage or self-employment. Women and girls were either put in a Job-Skills track or a Business Development Services (BDS) track. The Job-Skills track offered training in six different areas, including office/computer skills (Adoho et al., 2014).

Sama's Training and Job Programs in Nairobi, Kenya - provided classroom-based training in digital skills, called Artificial Intelligence 101 (AI 101), as well as other occupation skills needed for digital work, business processing outsourcing (BPO) industry and job search. Sama's Delivery Centre (SamaDC) provided employment opportunities to those graduating from the training programme. Hired youth worked on digital projects in which work included data classification, image tagging, creating datasets for machine learning algorithms and so (Atkin et al., 2021).

As part of the *ACCESS Nigeria IT job skills training programme*, recent university graduates received training in skills relevant to Nigeria's ICT sector, including a certification for the skills obtained. The training was focused on three "foundational competencies" important for working in the country's BPO sector. These were communication, computer, and cognitive skills (Croke et al., 2023).

The Ninaweza project was coordinated by the Internation Youth Federation and implemented by The African Centre for Women, Information and Communication Technology (ACWICT). Launched in 2011,

it provided training in ICT and life skills as well as support in internships and job placement for young women in Nairobi. The technical training in ICT was a key component, being based on ACWICT's study of local industry needs. The ICT training included both hardware and software, as well as entrepreneurship and BPO (De Azevedo et al., 2013).

Youth vocational education intervention in Western Kenya targeted out-of-school youth through randomised allotment of vocational education tuition vouchers. Some of the courses on offer included computer training (Miguel, 2016).

Job Matching in Addis Ababa, Ethiopia made use of the Gale-Shapley Deferred Acceptance algorithm to maximise matching efficiency between jobseekers and firms. The organisers of the job matching process hosted two job fairs within the Addis Ababa university campus for a group of jobseekers and firms. While participating firms and youth were free to interact in the fair, the algorithm provided both firms and jobseekers with a personalised list of meetings that indicated 15 firms that a particular individual should meet during the fair. Through an understanding of the baseline characteristics of both firms and individuals seeking to find jobs, the algorithm was supposed to recommend suitable matches. This would have increased the probability of a hiring taking place (Abebe et al., 2017).

Within the *Jobseeker training to join and use LinkedIn in South Africa scheme* jobseekers already participating in job readiness programmes in different South African cities were assigned to be given four hours of training in using LinkedIn. Training involved helped creating a LinkedIn profile, building networks and job search and application training (Wheeler, 2019).

A study in Cameroon assessed the use of ICT among those aged 15-35 years, where ICT refers primarily to the use of internet services by employed people to have found their job (Nouffeussie et al., 2022).

The Niger-Delta Job creation and conflict prevention initiative (Youth Employment Project), YEP) was a United Nations Development Programme (UNDP) initiative taken up by the Delta State Government and the Shell Petroleum Development Corporation (SPDC) in 2006 to promote peace and combat youth unruliness in the Niger-Delta region. Youth were trained in different vocational and technical skills including ICT (Ahmed, 2016).

The YouthMap Uganda Internship Program was part of the United States Agency for International Development (USAID)-funded YouthMap initiative managed by the International Youth Foundation. This 14–15 months programme aimed to strengthen the employability of young Ugandans aged 23-30 years by providing them mentorship, skill development opportunity and internship facility. Internship placement was spread across various sectors including the ICT sector. The foundational skills training included ICT skills (Duggleby et al., 2015).

The International Organisation for Migration (IOM) and UNDP oversaw the implementation of *Beyond Bentiu Protection of Civilian Site (PoC) Youth Reintegration Strategy in Sudan* which aimed for conflict resolution through activities bringing people of different ethnic groups together and creating employment opportunities. These opportunities were intended to consume the time and energy of young people who might otherwise be involved in crime and violence. The youth centre built under the project aimed to develop mutual tolerance and promote peace and social cohesion through the provision of recreational and educational services. It included among other things an ICT training centre (IOM, 2019).

The Youth Employment and Empowerment Programme (YEEP) in Sierra Leone was a youth development programme consisting of several strategic interventions to empower youth to participate

in the country's development. A key aspect was increasing the employability of young people as part of UNDP's efforts to support the government of Sierre Leone. YEEP included implementation of Business Development Services (BDS), Career Advising and Placement Services centres (CAPS), the Graduate Internship Programme (GIP), the Sierra Leone Agricultural Business Initiative (SABI), and a policy development and institutional development programme. CAPS offered training in information technology and promoting job search skills (Simmons et al., 2015; and Adablah and Bockarie, 2018).

Automotive Training and Re-Skilling in the Post-COVID Economic Recovery for Vulnerable Youth and Women in South Africa was intended to support TVET colleges and equip youth and women in skills relevant to the automotive industry in post-COVID South Africa. As part of the programme, training in ICT and digital software was delivered within TVET colleges to facilitate better digital and online teaching and learning. Other programme elements included lecturer development in digital software use and support of online platforms connecting youth to the automotive industry and relevant job opportunities. Accordingly, financial support was provided to an automotive career's platform called the National Association of Automotive Component and Allied Manufacturers' (NAACAM) and active promotion of the Harambee SAYouth platform, a platform that links young people to relevant job opportunities in the automotive industry, was made possible (UNDP, 2022).

Mali Out of School Youth Project (Projet d'Appui aux Jeunes Entrepreneurs, PAJE-NIETA) was a USAID/Mali designed project aimed at enabling 14-25 years old school dropouts or youth who had never been to school to gain education, become economically productive and consequently improve their lives and those of their communities. Education Development Center, Inc. (EDC) implemented the programme in collaboration with multiple other organisations. Education, entrepreneurship training and training in other service industries were important components in the programme. Specifically, PAJE-NIETA trained young people to use mobile technology to access an EDC developed application – Stepping Stone – that provided education lessons (USAID, 2022).

Guinea Stepping up Skills Project aimed at bringing an overall increase in the number of youths employed and training both the public and private workforce to bring about long-term stability in Guinea. Skill acquisition training and gaining vocational certification were key to this. Graduates who were unemployed received opportunities for interning, certification and entrepreneurship training. ICT was one of the many sectors marked out for priority support (World Bank, 2023).

Somali Youth Livelihoods Program, funded by USAID and implemented by EDC, provided 15-24 years olds with skills necessary for internships, job placement or self-employment. Information technology was an important programme element, where participants used mobile and internet applications to connect with potential employers. Mobiles and MP3 were used to provide education programmes. ICT incorporated through InfoMatch, the Shoqodoon website and Interactive Audio Instruction (IAI) (Cook and Younis, 2012).

The Youth Connekt Zimbabwe project, implemented by UNDP and the Government of Zimbabwe focused on entrepreneurship development, skills development, increasing employment opportunities and generating better network and dialogue. Reducing the digital divide was one of the recognised priorities of the project. An online youth portal was created for information sharing among the youth and engaging a diverse group of stakeholders. A Connekt e-store functioned as a platform where young people could market and scale existing and future youth Connekt businesses (UNDP, 2023).

Youth Empowerment through Agricultural and Value Chain Development Project (YEEP) in South Sudan provided skills, entrepreneurship and value chain development training to youth and women in institution and community-based settings. i-Hubs were a critical factor in increasing the employability of participants. YEEP operationalized five i-Hubs in selected locations, which provided computer and internet facilities. These i-Hubs provided numerous trainings including career counselling and guidance by assisting in Curriculum Vitae (CV) creation, helping with interview techniques and offering mentorship in entrepreneurship skill development and business services (Kimote, 2023).

Design choices for digital interventions include:

- Duration of the programme: The LinkedIn use training in South Africa was four hours long and spread over six to eight weeks (Wheeler, 2019). The *Somali Youth Livelihoods Programme* (SYLP) was a four year long programme. EPAG in Liberia included a six months classroom-based training together with a six-month long follow-up support for finding a job (Adoho et al., 2014). The *AI 101* programme in Kenya provided five hours training every day for a period of ten days (Atkin et al., 2021). The *Ninaweza* project was a two-year long project (De Azevedo et al., 2013).
- Programme design informed by research: The Automotive Training and Re-Skilling programme in South Africa was designed following a rapid needs assessment research that analysed the skills-equipment gap and helped delineate four focus areas needing programme support. These were that TVET colleges had limited resources to buy new technology that could aid teaching, the automotive sector needed more youth skilled in blended learning, ICT equipment and education for both learners and teachers was critical to be able to access modern learning materials and that curriculum needed reworking (UNDP, 2022).
- Partnership and collaboration: Project components in the Automotive Training and Re-Skilling programme in South Africa were developed in partnership with the participating TVET colleges taking into consideration the specific needs of each college (UNDP, 2022). Some were standalone digital programmes, such as in the Digital Skills training and Job Program in Kenya. Others were delivered in combination with other programmes. The LinkedIn use training in South Africa was built into the already existing job readiness programmes (Wheeler, 2019)
- Programme elements: The LinkedIn training combined in-person instructions, discussion sittings as well as guidance and encouragement via emails (Wheeler, 2022). Job linking platforms and applications were set up to connect young people

to job opportunities as seen in the SAYouth platform (UNDP, 2022) and InfoMatch (Cook and Younis, 2012)

- Governance of implementation: SYLP had several implementing partners with many local non-government organisations (NGOs) and international non-government organisations (INGOs) providing the training support. Helped develop capacity of implementing partners (IPs) (Cook and Younis, 2012). Four NGOs identified by the Liberian ministry managed EPAG implementation (Adoho et al., 2014).
- Target groups of the intervention: The SamaDC programme hired Sama training programme graduates for their digital projects. They were employed for an average of 25 months (Atkin et al., 2021). The *Ninaweza* project targeted young women residing in informal encampments in and around Nairobi, Kenya (De Azevedo et al., 2013).

What has been the implementation experience of digital intervention programmes?

This section presents evidence on the implementation of digital Intervention programmes. The evidence on implementation most usually comes from process evaluations, though some impact evaluations may also provide relevant data.

Sustainability

Under the YEEP in Sierre Leone, CAPS centres provided computer training alongside career advice and internship provision, helping youth pick jobs that complement their interests and competencies. One major roadblock in CAPS implementation has been their lack of inclusion into the university curriculum despite being located within the university. In the absence of institutional support facilities in many centres have worsened as they must rely solely on continuous donor support (Adablah and Bockarie, 2018).

One of the sustainability strategies in the PAJE-NIETA programme in Mali was to use mobile phones to link youth to market information as well as job networks. But the mobile phones fell into disuse within this period. PAJE-NIETA's m-learning platform failed as the lessons in the mobile phones could no longer be accessed by participants when the mobile devices turned obsolete. Participants were also not motivated to buy new devices as the first one was given free of charge (USAID, 2022).

Partnerships

In the *Automotive Training and Re-Skilling* programme in South Africa, creation of employment platforms matching employers to jobseekers were identified as an important factor to reduce youth unemployment. The SAYouth platform received 12,230 student registration and was able to successfully direct 694 participants to jobs or other income generating activities. The TVET colleges involved were able to achieve these results even without being able to pay much attention to student participation and enrolment in these platforms. These platforms greatly benefited due to the partnership with key stakeholders in the automotive industry National Association of Automotive Component and Allied Manufacturers (NAACOM) and Harambee) as they were able to provide the needed

17

expertise as well as existing products to help manage these platforms without having to begin from scratch (UNDP, 2022).

In SYLP, ICT was able to counter high illiteracy rates of participating youth by making available audio resources on financial literacy and entrepreneurship. The interactive audio instruction element of SYLP incorporated Somali oral tradition of storytelling for educational purposes and this way was able to reach otherwise distant and illiterate participants. In delivering these services, the programme benefitted from ICT partnerships such as with Souktel for the InfoMatch system and partnering with Somali cell phone service providers Telesom and Nationlink (Cook and Younis, 2012).

Technological factors affecting implementation

In SYLP, increasing mobile ownership among Somali youth favoured the use of InfoMatch, an SMS, voice and web-based application for job matching. Even in cases where job seeking youth were not able to find employment, they appreciated the presence of InfoMatch as another source of information (Ibid, Cook and Younis 2012).

In SYLP, programme location in conflict settings led to technological challenges in the use of ICT. In one instance telecom service provider, NationLink, lost its internet facility due to a rocket strike in Mogadishu. As a result, InfoMatch could not be accessed in that specific region. Despite these challenges, the evaluation reports that SYLP would not have reached the number of participants it had without the use of ICT (Ibid, Cook and Younis 2012).

The Automotive Training and Re-Skilling programme in South Africa suffered due to load shedding. Online lecturer training suffered as Wi-Fi remained unstable and many teachers were forced to take training at home in the absence of free Wi-Fi through their respective institutions.

"Loadshedding caused network issues during online sessions but on the technical training there was no challenge" (UNDP, 2022: p,61).

Requirement of technical know-how

In Somalia's SYLP programme ICT was also used by IPs for financial reporting and to collect monitoring and evaluation information. Use of cell phones proved to be a cost-effective means to gather feedback and was a quick, direct and easy access way to contact

18

participants which were otherwise difficult to reach. But the evaluators note that ICT use needed exhaustive technical support and training. IP staff and participating youth needed to be given support and guidance through manuals and training aids. Not all IPs put the necessary time and resources into such support (Cook and Younis, 2012).

In the *Automotive Training and Re-Skilling* programme in South Africa, the lecturer development training in blended and online teaching methods using digital software was overall seen as successful. But it faced issues from participant teachers not being well-informed on the time and effort needed to complete the training. Hence, improved selection procedure for participants was recommended (UNDP, 2022).

Other Issues

ICT equipment for the *Automotive Training and Re-Skilling* programme in South Africa was centrally procured through the UNDP. This posed implementation challenges as TVET colleges needing even one equipment had to wait long for it to be delivered and set up. This delay meant that some colleges did not even make use of the machinery (UNDP, 2022).

The effects of digital interventions

A meta-analysis (reported in detail in Annex 1) was conducted to determine the effect of digital interventions on employment status, material well-being, programme attendance, income, business job offers, psychological well-being and skill acquisition. A total of six impact evaluations were included in this analysis (Abebe, 2017; Adoho, 2014; Croke, 2023; De Azevedo, 2013; Nouffeussie, 2022; Wheeler, 2019).

Meta-analysis combines results from different studies to provide an average effect. This effect is usually reported as a standardised mean difference (d). But considering the small sample size here, we calculate the Hedge's g rather than d to account for variance in the studies. **Overall, digital interventions had a moderate positive effect on young people's chances of finding a job** (g=0.14) **and a rise in their income** (g=0.11)**. This effect on employment is equivalent to 13% greater employment amongst youth exposed to the programme compared to those not in the programme (Annex 2).**

There was also an improvement the skills they acquired (g=0.06), but a deterioration in psychological outcomes (g=-0.04). These findings are on a single study.

On the whole, the confidence in study findings is low as evident from the critical appraisal of impact evaluations presented in Annex 3.

Table 2: Studies of digital intervention	n programmes in sub-Saharan Africa
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Study	Intervention	Findings
Abebe (2017)	A job matching process in Addis Ababa, Ethiopia where two job fairs were organised within the Addis Ababa university campus for a group of jobseekers and firms	Participants versus control: Probability of finding permanent job: 6% higher.
Adoho (2014)	Economic Empowerment of Adolescent Girls and Young Women (EPAG) in Liberia included a classroom-based technical training, followed by a transition phase in which participants were provided the support to move into wage or self-employment.	Participants versus control: Engagement in income-generating activities: 18% higher. Rise in income: 80% increase. Savings: 50% more likely.
Croke (2023)	In the ACCESS Nigeria IT job skills training programme, recent university graduates received training in skills relevant to Nigeria's ICT sector, including a certification for the skills obtained	Participants versus control: Employment: 1.7% more. Job search: 5.4% more likely.
De Azevedo et al. (2013)	Life skills training to young people as part of an 8-week course with advanced training in ICT, Kenya	Employment: Group given ICT and life skills: 39.3% Group given ICT only: 34.4% Control group: 26%
Nouffeussie (2022)	Use of ICT among those aged 15-35 years in Cameroon, where ICT refers primarily to the use of internet services by employed people to have found their job.	Participants versus control: Probability of finding a job: 17-38% higher.
Wheeler (2019)	Jobseeker training to join and use LinkedIn in South Africa. Jobseekers already participating in job readiness programmes in different South African cities were assigned to be given four hours of training in using LinkedIn.	End of programme employment: increase from 70% to 77%. Participant earnings also raise by at least \$480 over the course of 12 months. Participants with LinkedIn profile increases from 48 to 80%.

Study-level summaries

Atkin et al.'s (2021) analysis of a training and job programme in Nairobi, Kenya found that youth who received both the training in digital skills and were part of *SamaDC* (employment provider for digital work) had a **significant increase in earnings, were less likely to be** unemployed and tended to work for more hours. The evaluation reported 37% higher earnings, 10% less chances of being unemployed and working 22% more hours compared to the control group. Also, current and past experience with *SamaDC* made a significant positive effect on income and employment and allowed participants to be more selective in their work choices. The effect on women's income is particularly large, with women who received training and were part of the job group getting 60% higher income than those without training and job programme.

Participants in the digital skills training and *SamaDC* were also **more likely to shift from non-**ICT industries to the ICT sector and worked mostly in salaried jobs rather than being selfemployed. In contrast, those only receiving digital skills training had far lesser participation in ICT industry, mostly because they were unable to find ICT-specific jobs at the end of training. Importantly, participants in the training plus job programme were found to experience greater life satisfaction, better money management and reduced reliance on money from government and relatives (Atkin et al., 2021).

Taking part in the ACCESS Nigeria IT job skills training programme, participants significantly improved their ICT skills with markedly improved scores in the international benchmark assessment score after their training. A 2-year post training assessment revealed that those who underwent training were 1.7 percentage point more likely to be employed in the ICT sector. But there was no significant change in overall employment, or the hours worked. There was a difference in programme effect based on geographical location. The ICT training was most effective at the Abuja centre as those trained here had a 7.7 percentage points higher likelihood of finding a job in ICT. This was attributable to varying political situations in different parts of Nigeria, differing labour demand or training quality differences between locations (Croke et al., 2023).

In Kenya's *Ninaweza* project, ICT skills training generated a significant increase in knowledge among participants. Those receiving both ICT and life skills training had **14% greater chance of finding employment than the control group**. Similarly, the income gain was higher for those receiving training as opposed to those not. Overall confidence in qualification and optimism about finding work was also higher among those receiving training. A general response from participants was that ICT training greatly helped them prepare for jobs and to get employment (De Azevedo, 2013).

22

Abebe (2017) found that the job matching experiment linking jobseekers to firms through a job fair **largely failed as most interactions at the fair did not convert into job interviews**. Only 11% of attending jobseekers received these interviews and finally, a total of 76 offers went out to 45 participants. Only 14 jobseekers accepted the offers, establishing a high rejection rate. Despite this being the case, the Gale-Shapley Deferred Acceptance algorithm was able to match jobseekers to the best possible firm for them at the fair. **The predictability of the algorithm was deemed good and worth pursuing by both firms and jobseekers** (Abebe et al., 2017).

The training programme to join and use LinkedIn in South Africa had a positive effect on employment, number of hours worked and earnings of the participant. Job security was also marked as high as all participants who found a job at the completion of the programme were able to retain the job for another year. The training initiated a jump in LinkedIn membership among participants (rise from 48 to 80%). There was also a general improvement in LinkedIn use, and this had a quantitatively significant improvement in employment (Wheeler et al., 2019).

In the vocational education tuition vouchers in Kenya, training in ICT was one among the preferred industries for participating youth. Those holding a secondary degree were more likely to opt for a course in computers. Computer, secretarial or business courses were some of the industries mainly taken up by women. **Access to vocational education resulted in higher earnings** (Miguel, 2016).

Cost analysis

Considering the variation between different interventions, the programme settings and the evaluation methodology, it is difficult to provide a comparative cost analysis of the programmes discussed.

The analysis in UNDP (2022) indicated that the programme was cost-efficient. Evaluators noted that a very committed funder (UNDP), a short timeframe for programme completion and also central procurement of most equipment and services to be delivered through the TVET colleges was important in ensuring the programme was efficient.

The ACCESS Nigeria IT job skills training programme was assessed to not be cost-effective. The cost of programme training for each individual was estimated to be US\$606, but it did not produce a significant effect on income generated or net employment two years after receiving training. Significantly, Kevin et al. (2023) note that despite the programme not being cost-effective, it was able to produce two crucial financial benefits. First, it pushed for a shift to the ICT sector in a context where the Nigerian government wanted to develop this sector. This programme came in and addressed the issue of skill gaps and facilitated this shift. Second, in a sector that was previously male-dominated the programme was able to get women to move into the ICT sector. This had an important effect on Nigeria's economy by improving labour market movement and tackling the wage gap between the genders by creating more work possibilities for women in ICT (Kevin et al., 2023).

The training programme to join and use LinkedIn in South Africa estimated that the programme raised per participant earnings by a minimum of US\$480 over a year's time. This was almost ten times more than the programme cost per participant, which was at US\$48. Considering the increase in chances of being employed and earnings gained, this training which built on an already existing programme was cost-effective (Wheeler, 2019)

In *The YouthMap Uganda Internship Program,* the evaluators noted that the internal rate of return for the programme was low, so the intervention was not justified based on costbenefit analysis (Duggleby et al., 2015). However, they did indicate that statistical rigor of the results is low (Duggleby et al., 2015).

24

Implications of study findings

Overall, the findings from the impact evaluations on digital intervention programmes show that these programmes have a moderate positive effect on youth employment and income. Additionally, there is an improvement in the psychological well-being and skills acquired by young people.

Implications for policy and practice

Since the evidence available is of a limited nature, there are several design decisions to be made by those designing and implementing digital intervention programmes:

- In sub-Saharan Africa where ownership of digital technology such as mobile phones and computers is very low, programme implementers and designers need a plan to facilitate access.
- 2. A strategy for the maintenance of digital infrastructure is required to ensure the sustainability of the project.
- 3. Online training needs to consider difficulties such as conflict settings, load shedding and unstable internet while designing programmes.
- 4. Considering there is evidence that women are more open to participating in digital interventions, there is a need to look into targeting and involving women specifically in such programmes. This can tackle occupational segregation due to gender norms and open up new sectors for women's employment.
- 5. While digital interventions are often built on or accompany existing programmes, there is a need to investigate whether these are effective as standalone programmes.
- Procurement of digital technology can be an expensive task for local institutes, centres, NGOs and other implementing organisations. There needs to be a good assessment of cost-effectiveness and ways to reduce these costs.
- A proper link between digital skills training provided and industry needs should be established. Platforms that bring in multiple stakeholders can streamline this process and ensure investment in industry specific training.

Implications for research

There is a considerable evidence gap for digital intervention programmes in sub-Saharan Africa. Digital interventions often form only a small component of larger projects. Hence, their effectiveness, the challenges faced during implementation and cost-effectiveness are not evaluated in any detail. Most studies fall short in providing substantial and useful descriptions of these interventions making it difficult to compare and analyse different digital intervention programmes.

The evidence base needs to be built especially with more impact evaluations as well as process evaluation that focus closely on digital interventions and their effect on young people. Considering that some studies indicate that ICT training can bring in more women into employment, it would be useful to have more studies that investigate the differential effect of digital programmes on men and women.

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Annex 1 Results of meta-analysis

This annex presents the forest plots from the included studies for this report. Each horizontal line in a forest plot shows the 95% confidence interval for Hedges' g for a specific study, with the meta-analysed effect size represented by the diamond at the bottom of the figure. If the horizontal line crosses the vertical line then that study finds no significant effect.

The I² and Q statistic are measures of heterogeneity, that is the extent of variation in effect sizes between studies. Where there is substantial variation, then it is useful to conduct further analysis to understand the sources in that variation.

The forest plots show that digital interventions' effect on employment, program attendance, psychological skills, and youth skills were calculated but were mostly statistically insignificant. The exception is the positive effect on employment (g=0.14).



Figure A1.1: Effect of digital interventions on youth employment

Notes: CI = confidence interval; p = prob value. I^2 , $H^2 \tau^{2}$, and Q are all measures of heterogeneity. Test of Θ =0 is a test that none of the effect sizes are significantly different from 0, and z the significance test for that statistic. See explanation of figure in the text.

Figure A1.2: Effect of digital interventions on program attendance



Notes: CI = confidence interval; p = prob value. I^2 , $H^2 \tau^2$, and Q are all measures of heterogeneity. Test of $\Theta=0$ is a test that none of the effect sizes are significantly different from 0, and z the significance test for that statistic. See explanation of figure in the text.

Figure A1.3: Effect of digital interventions on psychological outcomes



Random-effects REML model

Notes: CI = confidence interval; p = prob value. I^2 , $H^2 \tau^2$, and Q are all measures of heterogeneity. Test of Θ =0 is a test that none of the effect sizes are significantly different from 0, and z the significance test for that statistic. See explanation of figure in the text.

Figure A1.4: Effect of digital interventions on youth skills



Notes: CI = confidence interval; p = prob value. I^2 , $H^2 \tau^2$, and Q are all measures of heterogeneity. Test of Θ =0 is a test that none of the effect sizes are significantly different from 0, and z the significance test for that statistic. See explanation of figure in the text.

Annex 2 Calculation of meaningful effect sizes

The standardized mean difference (SMD) can be converted to an odds ratio (OR) using the formula $lnOR = \frac{g\pi}{\sqrt{3}}$ (Borenstein et al., 2009). Using the odds ratio, a 2x2 table can be created, for which we need an assumption of the share of the control group gaining employment. We assume 50%. We also need to assume the sample size for treatment and control, though the result is not sensitive to that assumption. We assume 100 in each group. With Hedge's g=0.14, OR=1.29. This gives the 2x2 table.

	Employed	Unemployed	Total
Treatment	56.3	43.7	100
Control	50	50	100
Absolute % change		5.0	
% change (cf comparison rate)		12.6%	
Number need to treat		16	

Table A2.1: 2x2 table to calculate percentage change in employment

The number needed to treat is calculated as the number treated divided by the absolute difference in employment between treatment and control groups.

Annex 3 Critical appraisal

Critical appraisal assesses the confidence we can have in study findings, being classified as high, medium or low. The results of the critical appraisal – taken from the EGM - inform the overall confidence we have in the findings reported in the technical report.

		Study
Study	Confidence	Design
Abebe (2017)	High	Impact
Adoho (2014)	Low	Impact
Atkin (2021)	Medium	Impact
Croke (2023)	Low	Impact
De Azevedo (2013)	High	Impact
Miguel (2016)	Low	Impact
Nouffussie (2022)	Low	Impact
Wheeler (2019)	Medium	Impact
Adablah (2018)	Medium	Process
Ahmed (2016)	Medium	Process
Cook (2012)	High	Process
Duggleby (2015)	Low	Process
IOM (2019)	Medium	Process
Kimote (2023)	High	Process
Simmons (2015)	High	Process
UNDP (2022)	High	Process
UNDP (2023)	High	Process
USAID (2022)	High	Process
World-Bank (2023)	High	Process

Table A3.1: Critical appraisal of included studies

Table A3.2: Threshold values for critical appraisal

		No. of included studies for effect estimate		
		5 or less	6-9	10 or more
Study assessment	Mainly Low	Low	Low	Low
	Medium	Low	Medium	Medum
	Mainly High	Low	Medium	High

Mainly low = At least 60% of studies are rated low

Mainly high = At least 60% of studies are rated high

Medium = any estimate not covered by the above two categories

Adjustment for heterogeneity: reduce by one level if $I^2 > 80\%$

Application to this report

In the critical appraisal of eight impact evaluations, only two studies have high confidence in study findings. Among the rest, two studies are rated medium in confidence and five (63%) are rated low. Hence, we have low confidence in our effect estimate.

From eleven process evaluations, seven (64%) are high confidence studies, three are medium confidence and one is a low confidence study. This indicates that the confidence in study findings is high.