



SOUTH SUDAN

Digital Learning Landscape Analysis

Evidence, modality prioritization and a phased investment case for offline-first learning

A technical report prepared for the Ministry of General Education and Instruction (MoGEI) and UNICEF South Sudan under the GPE-TESS Programme.

June 2026



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Technical Report

Prepared for	Ministry of General Education and Instruction (MoGEI), with technical and financial support from UNICEF South Sudan,
Commissioned by	UNICEF South Sudan under the GPE Transforming Education in South Sudan (GPE-TESS) Programme
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About this document

This technical report presents the findings of the South Sudan Digital Learning Landscape Analysis, conducted under the GPE-TESS Programme for the Ministry of General Education and Instruction (MoGEI) and UNICEF South Sudan. It draws on a 31-source desk review and seven key informant interviews conducted between February and May 2026. All unit costs are planning proxies from comparable fragile contexts and are flagged as such; South Sudan-specific costs must be confirmed before Phase 2 investment allocation. Data gaps are recorded transparently in Annex A and are not substituted with assumed figures.

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Contents

Acknowledgements 2

Table of Contents 3

Abbreviations and Definitions 4

Executive Summary 6

Six Digital Learning Principles for South Sudan 6

Modality Tiers at a Glance 7

Three-Phase Strategic Roadmap 8

1. Introduction and Methodology 9

1.1 Background and Purpose 9

1.2 Scope and Analytical Focus 9

1.3 Methodology: Two-Phase Sequential Design 10

1.3.1 Phase 1: Desk Review 10

1.3.2 Phase 2: Key Informant Interviews 10

1.3.3 KII Sampling Rationale 11

1.3.4 Analytical Framework 11

1.4 Data Quality and Limitations 11

2. Country Context and the Learning Crisis 13

2.1 Population and Education Indicators 13

2.2 Learning Baseline: EGRA/EGMA Evidence 13

2.3 Out-of-School Children: State-Level Concentration 14

2.4 Displacement, Flooding and Seasonal Disruption 14

2.5 Teacher Workforce 15

3. Enabling Environment for Digital Learning 16

3.1 Mobile Network Operator Coverage 16

3.2 State-Level Infrastructure and Modality Implications 17

<u>3.3 Affordability and Device Access</u>	<u>17</u>
<u>3.4 Universal Service Access Fund (USAF)</u>	<u>18</u>
<u>3.5 The DHIS2 Precedent: Offline-First at Scale in South Sudan</u>	<u>18</u>
<u>4. Digital Learning Programmes and System Capacity</u>	<u>20</u>
<u>4.1 Programme-by-Programme Analysis</u>	<u>20</u>
<u>4.1.1 Education on Air II (MoGEI / UNICEF / UNESCO / EDC)</u>	<u>20</u>
<u>4.1.2 Junub Academy Model 1: National E-Learning Platform (MoGEI / Educare)</u>	<u>21</u>
<u>4.1.3 Junub Academy Model 2: Offline Classroom Pilot (MoGEI / Educare / UNICEF)</u>	<u>21</u>
<u>4.1.4 ALP Digital Integration (MoGEI / UNICEF)</u>	<u>22</u>
<u>4.1.5 IRC ApreDIA + vTLC (IRC / Airbel Impact Lab)</u>	<u>22</u>
<u>4.1.6 WPDI Satellite Community Centres (WPDI / Intelsat)</u>	<u>23</u>
<u>4.1.7 NRC Digital Learning Pilots</u>	<u>23</u>
<u>4.1.8 EMIS Decentralized Digital Collection</u>	<u>23</u>
<u>4.2 Content Quality: A System Constraint</u>	<u>23</u>
<u>5. Facilitation and Teacher Digital Capacity</u>	<u>25</u>
<u>5.1 Teacher Workforce Profile and Digital Skills Gap</u>	<u>25</u>
<u>5.2 Six Functioning CPD Channels: Detailed Analysis</u>	<u>26</u>
<u>5.3 Master Trainer Model: Evidence Against Standalone Deployment</u>	<u>27</u>
<u>5.4 DHIS2 Granular Site Management as CPD Template</u>	<u>28</u>
<u>5.5 Device Subsidy and Teacher Access</u>	<u>28</u>
<u>6. Learner Profiles and Structural Exclusion</u>	<u>30</u>
<u>6.1 Profile 1: Girls in Remote Rural Schools</u>	<u>30</u>
<u>6.2 Profile 2: Internally Displaced Children</u>	<u>31</u>
<u>6.3 Profile 3: ALP Learners</u>	<u>31</u>
<u>6.4 Profile 4: Children with Disabilities</u>	<u>32</u>
<u>6.5 Profile 5: Nomadic and Pastoralist Children</u>	<u>32</u>
<u>6.6 Structural Exclusion Summary</u>	<u>32</u>
<u>7. Governance, Policy and Financing</u>	<u>33</u>
<u>7.1 Policy Framework: Six Documents and One Conference</u>	<u>33</u>

<u>7.2 Policy-Practice Gap by GESP Objective</u>	<u>33</u>
<u>7.3 DLCC Design and Sustainability Rationale</u>	<u>34</u>
<u>7.4 Financing Architecture</u>	<u>34</u>
<u>8. Lessons from Comparable Contexts</u>	<u>36</u>
<u>8.1 Eastern DRC: Facilitated Tablet Delivery in Conflict Settings</u>	<u>36</u>
<u>8.2 Somalia: Radio at National Scale with IRI Format</u>	<u>36</u>
<u>8.3 Kenya and Rwanda: USSD Zero-Rating Precedents</u>	<u>37</u>
<u>8.4 South Sudan DHIS2: Offline-First at National Scale</u>	<u>37</u>
<u>8.5 Junub Academy Model 2: Offline Classroom Evidence</u>	<u>38</u>
<u>8.6 Cross-Cutting Lessons</u>	<u>38</u>
<u>9. Six Digital Learning Principles for UNICEF and MoGEI</u>	<u>39</u>
<u>9.1 Principle 1: Offline-First Is an Equity Requirement</u>	<u>39</u>
<u>9.2 Principle 2: Structurally Excluded Learners at the Centre</u>	<u>39</u>
<u>9.3 Principle 3: Facilitation Determines Outcomes</u>	<u>40</u>
<u>9.4 Principle 4: Governance Before Scale</u>	<u>40</u>
<u>9.5 Principle 5: Use What Works in the Same Environment</u>	<u>40</u>
<u>9.6 Principle 6: Measurement Before Scale</u>	<u>41</u>
<u>10. Critical Risks to Scale: Unresolved Data Gaps</u>	<u>42</u>
<u>10.1 R1: ALP Learning Outcomes Gap (CRITICAL)</u>	<u>42</u>
<u>10.2 R2: Teacher Digital Skills Baseline (HIGH)</u>	<u>42</u>
<u>10.3 R3: Unit Cost Gap (HIGH)</u>	<u>42</u>
<u>10.4 R4: USAF Implementation Gap (HIGH)</u>	<u>43</u>
<u>10.5 R5: Content Quality Gap (HIGH ACTIVE RISK)</u>	<u>43</u>
<u>10.6 Risk Summary</u>	<u>43</u>
<u>11. Three-Phase Strategic Roadmap</u>	<u>44</u>
<u>11.1 Phase 1: Governance Foundation and Evidence Base (Months 0–12)</u>	<u>44</u>
<u>11.2 Phase 2: Pilot Expansion and System Integration (Months 12–36)</u>	<u>45</u>
<u>11.3 Phase 3: Evidence-Based Scale-Up (Months 36+)</u>	<u>46</u>
<u>11.4 UNICEF Added Value</u>	<u>46</u>

Annex A: Data Gaps Register 48

Annex B: Early Grade MEL Package 49

Annex C: KII Sampling Framework and Completion Status 50

Annex D: References 51

Primary KII Sources 51

Secondary Sources (Desk Review Phase 1) 51

Abbreviations and definitions

Abbreviation	Full Form	Definition
ALP	Alternative Learning Programme	A non-formal equivalency programme for over-age, displaced and out-of-school learners.
CEC	County Education Centre	Sub-national institutional hub for in-service teacher training (59 centres being rehabilitated).
CPD	Continuing Professional Development	Structured ongoing learning for teachers and facilitators.
CwD	Children with Disabilities	Children with physical, sensory, intellectual or developmental impairments.
DE4A	Digital Economy for Africa	World Bank assessment programme providing digital economy indicators for African countries.
DHIS2	District Health Information System 2	Open-source health data platform deployed across all 80 South Sudanese counties.
DLCC	Digital Learning Coordination Committee	Proposed inter-ministerial body to coordinate TFL investments.
EGMA	Early Grade Mathematics Assessment	Standardized oral assessment measuring foundational numeracy at Grades 1–3.

EGRA	Early Grade Reading Assessment	Standardized oral reading fluency instrument for foundational literacy.
EMIS	Education Management Information System	MoGEI school census database.
GESP	General Education Strategic Plan 2023–2027	MoGEI's overarching education sector plan.
GPE	Global Partnership for Education	Multilateral financing mechanism and funder of GPE-TESS.
GPE-TESS	GPE Transforming Education in South Sudan	Programme (2024–2028) funded by GPE, implemented by UNICEF and Save the Children consortium.
GSM	Granular Site Management	DHIS2 supervision model: facility-level officers, daily data, weekly dashboards and continuous mentoring.
ICT-CFT	UNESCO ICT Competency Framework for Teachers	Six-level framework defining teacher digital skills from basic literacy to knowledge creation.
IDP	Internally Displaced Person	Person who has fled their home but remains within national borders.
IRI	Interactive Radio Instruction	Radio format with built-in facilitator prompts, student response pauses and activity segments.
KII	Key Informant Interview	Structured qualitative data collection to fill evidence gaps.
MNO	Mobile Network Operator	Licensed telecommunications company providing mobile voice and data services.
MoGEI	Ministry of General Education and Instruction	Primary government ministry responsible for basic and secondary education policy.
MoICT	Ministry of Information, Communication and Technology	government ministry responsible for ICT policy and spectrum regulation.
NCA	National Communication Authority	Independent telecommunications regulator managing spectrum licensing and USAF.
NGO	Non-Governmental Organization	Independent organization, typically non-profit, operating outside government and donor agency structures; includes implementing partners cited throughout this analysis (e.g.,

		Save the Children, WPDI).
OOSC	Out-of-School Children	Children of official school age not enrolled in school.
PTR	Pupil-Teacher Ratio	Number of pupils per teacher at a given educational level.
RACHEL	Remote Area Community Hotspot for Education and Learning	Portable solar-powered offline server creating a local Wi-Fi hotspot.
TFL	Technology-Facilitated Learning	Use of digital tools to extend, support or enhance educational delivery.
USAF	Universal Service Access Fund	Regulatory fund managed by NCA, collecting 2% of MNO revenue.
USSD	Unstructured Supplementary Service Data	Menu-driven real-time protocol operating on the GSM network without internet.
WPDI	Whitaker Peace & Development Initiative	NGO operating satellite-supported community learning centres.

Executive summary

South Sudan's digital learning environment offers more practical foundations than current programme documents credit and carries structural risks they understate. This analysis draws on a desk review of 31 sources and primary research across seven stakeholder organizations, with seven key informant interviews conducted between February and May 2026. It identifies where investment can improve learning outcomes, and where it cannot without prior structural fixes. Of ten data gaps identified in Phase 1, none were fully closed: six achieved partial resolution, three remain unresolved and one was addressed through quality data rather than cost data. Three unresolved gaps block Phase 2 planning directly. Two are active risks in programmes currently operating.

The six principles below are not aspirational. Each is derived from operational evidence in this analysis. They define the binding logic for investment sequencing, modality selection and governance design. The modality tier table and three-phase roadmap that follow translate these principles into immediate decisions.

Six digital learning principles for South Sudan

Principle 1: Offline-first is an equity requirement. Electricity access: 7.2 per cent nationally. Internet penetration: 15.8 per cent. Smartphone penetration: 10.5–11 per cent. Radio and SD

card are the primary delivery infrastructure for 2.8 million out-of-school children. All other modalities are supplements, not substitutes.

Principle 2: Structurally excluded learners set the design standard. Girls: 53 per cent of OOSC. Unity OOSC rate: 82 per cent. Jonglei: 81 per cent. IDP children: 472,452. ALP enrolled: 189,000+, with zero digital outcome data. A modality that cannot function under Unity or Jonglei, conditions cannot be called a national strategy.

Principle 3: Facilitation determines outcomes, not hardware. Junub Academy Model 2 recorded pass rate gains from 22 per cent to 71 per cent (Warrap) and 30.3 per cent to 75.5 per cent (Cueibet) with a dedicated facilitator at every session. The same pattern holds in Eastern Democratic Republic of the Congo (DRC) and Somalia. No hardware procurement proceeds without a costed facilitation plan.

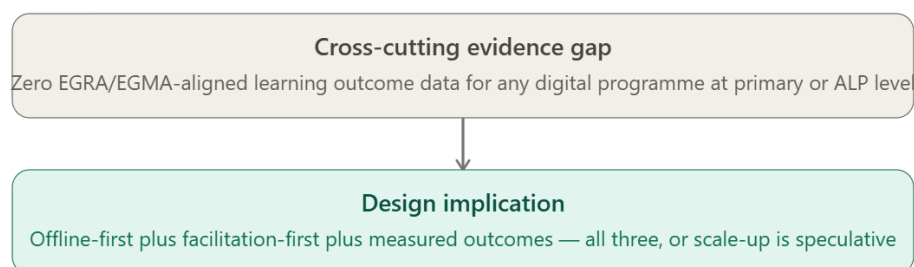
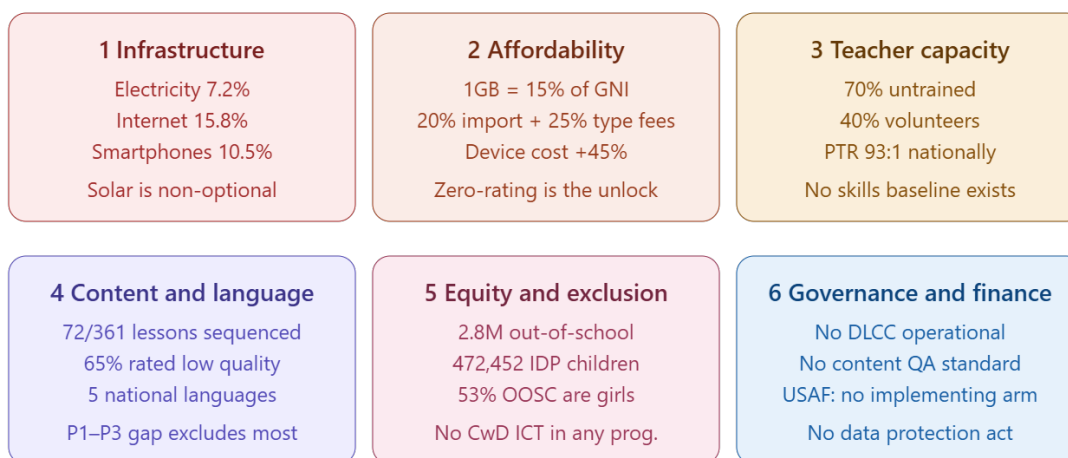
Principle 4: Governance before scale. No inter-ministerial coordination mechanism, content quality standard or teacher digital competency framework currently exists. The result: 65 per cent of 361 audio lessons already distributed on 3,000+ USB sticks are rated low quality. The DLCC must be established within 90 days of this report's finalization.

Principle 5: Use what already works in this environment. DHIS2 runs across all 80 counties on Android tablets, solar cabinets and offline sync under exactly the conditions education faces. The county hub model, hardware stack and procurement channels are available for direct transfer.

Principle 6: Measurement before scale. 189,000+ ALP learners. Zero outcome data from any ALP digital site. The only pre-test/post-test evidence covers 204 secondary students across two schools. Scale-up decisions made without EGRA/EGMA baselines are not evidence-based.

Three unresolved data gaps constrain Phase 2 planning: ALP learning outcomes (CRITICAL, Gap 4), South Sudan-specific unit costs (HIGH, Gap 5) and WPDI satellite site data (HIGH, Gap 8). Gap 9 (teacher digital skills baseline) has been upgraded to PARTIAL following integration of Digital 2026 proxy indicators, but a population-level baseline remains absent and the CPD investment allocation risk persists. Content quality assurance (HIGH, Gap 7) is partially resolved but remains an active risk in current operations. Total cost of closing all gaps in Phase 1: USD 67,000–112,000. Full gap register in Annex A. Risk analysis in Chapter 10.

Six clusters that define what is and is not feasible



Modality tiers at a glance

FIGURE 2: Digital Learning Modality Prioritisation Matrix

South Sudan — Updated with KII Phase 2 data (March 2026). Scoring: 1 = Very Low to 9 = Very High.

Solar Radio + IRI	None (broadcast)	9	9	7	9	7	41
SD Card + Picture Packs	None (offline)	7	9	5	7	7	35
USSD / SMS Learning	UPGRADED 5-7 2G only	7	7	5	7	7	33
Facilitated Offline Tablet	None (offline)	5	3	7	5	5	25
Blended OER + CPD Platform	Smartphone + data	5	5	5	3	5	23
Satellite Community Centre	Satellite VSAT	3	1	3	3	3	13

UNICEF South Sudan | GPE-TESS Programme (SC350187) | © UNICEF / Model, May 2026

Figure 1: Digital learning modality prioritization matrix, South Sudan (updated with KII Phase 2 data, March 2026). Scoring: 1 = Very Low to 9 = Very High. USSD/SMS upgraded 5 → 7 following MTN MoU and 66.5 per cent feature phone confirmation. Source: Desk Review §8.1; KII Synthesis Matrix (Updated), May 2026.

Tier	Modality	Cost/Child/Year	Decision
Tier 1	Solar radio broadcast (IRI format)	USD 1–5	Deploy now. Commission 50 IRI-format lessons in five national languages. Replace talk-heavy Education on Air scripts with interactive format.
Tier 1	SD card / USB + printed picture guides	USD 2–8	Deploy now, post-QA review only. Freeze distribution of content not reviewed by MoGEI NCDC Technical Review Committee. 72 of 361 lessons currently cleared.
Tier 2	USSD/SMS (zero-rated)	USD 1–4	Pilot. Upgraded score (5→7) following MTN MoU confirmation March 2026. Viable on 66.5% feature phone base.
Tier 2	Facilitated offline tablet centre (Kolibri / Junub Academy Model 2)	USD 15–40	Pilot. Facilitation infrastructure must precede hardware procurement. County Digital Learning Hub model proposed, co-financed with DHIS2 infrastructure.
Tier 2	Blended OER + teacher communities of practice	USD 5–15	Pilot. IRC vTLC model for CPD in IDP-adjacent contexts. WhatsApp-based with zero-rated access.
Tier 3	Satellite community hub (VSAT)	USD 50–150	Conditional. Cost-sharing with cross-sector partners required. WPDI site data unconfirmed (Data Gap 8: UNRESOLVED).

Note: All unit costs are planning proxies from comparable fragile contexts. South Sudan-specific unit costs must be confirmed before Phase 2 investment allocation is finalized.

Modality	Score /10	Cost USD/child/yr	Reach evidence	Outcome evidence	Tier
Solar radio broadcast	 8	1–5	~1.5M COVID-19	IRI confirmed	Tier 1 deploy now
SD card / USB + print	 7	2–8	3,000+ sticks	None primary	Tier 1 deploy now
USSD / SMS zero-rated	 7*	1–4	Not yet at scale	Comparable only	Tier 2 pilot
Facilitated tablet centre	 6	15–40	204 students	Strong S2 pilot	Tier 2 pilot
Blended OER + teacher CoP	 6	5–15	IRC vTLC	None SS	Tier 2 pilot
Satellite community hub	 4	50–150	WPDI unconfirmed	None	Tier 3 conditional

* USSD upgraded from 5 to 7 after MTN MoU (10 March 2026) and MoICT confirmation that zero-rating qualifies as a public benefit arrangement. Score reflects regulatory unlock; content depth limits remain.

Three-phase strategic roadmap

Phase	Priority Actions	Indicative Cost estimates	Lead
Phase 1 Months 0–12 Governance	DLCC established (Month 1–2). Teacher digital skills baseline TOR issued (Month 3). MTN/Zain MoUs operationalized. Content quality review of 361 radio lessons completed. EGRA/EGMA MEL framework integrated.	USD 67,000–112,000	MoGEI, UNICEF, UNESCO, MoICT
Phase 2 Months 12–36 Pilot Expansion	Three county digital learning hubs piloted. USSD pilot launched. ALP digital pilot with EGRA/EGMA baseline. Junub Academy extended to national language ALP content. CEC digital CPD programme piloted.	USD 610,000–1,000,000	MoGEI, UNICEF
Phase 3 Months 36+ Scale	Scale conditioned on Phase 2 learning outcome data. government financing through USAF education allocation. MNO co-financing through social good data tier.	TBD conditioned on Phase 2 evidence	MoGEI (primary), UNICEF, MNOs, USAF

Figure 3 illustrates the report's analytical architecture, mapping the nine chapters against their evidence sources.

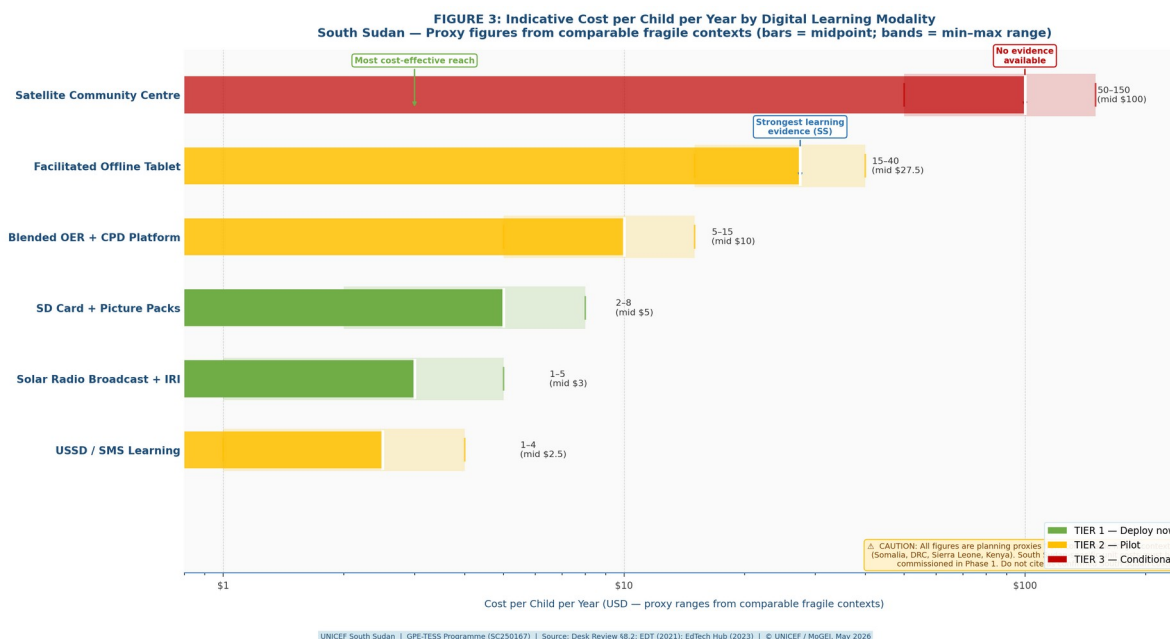
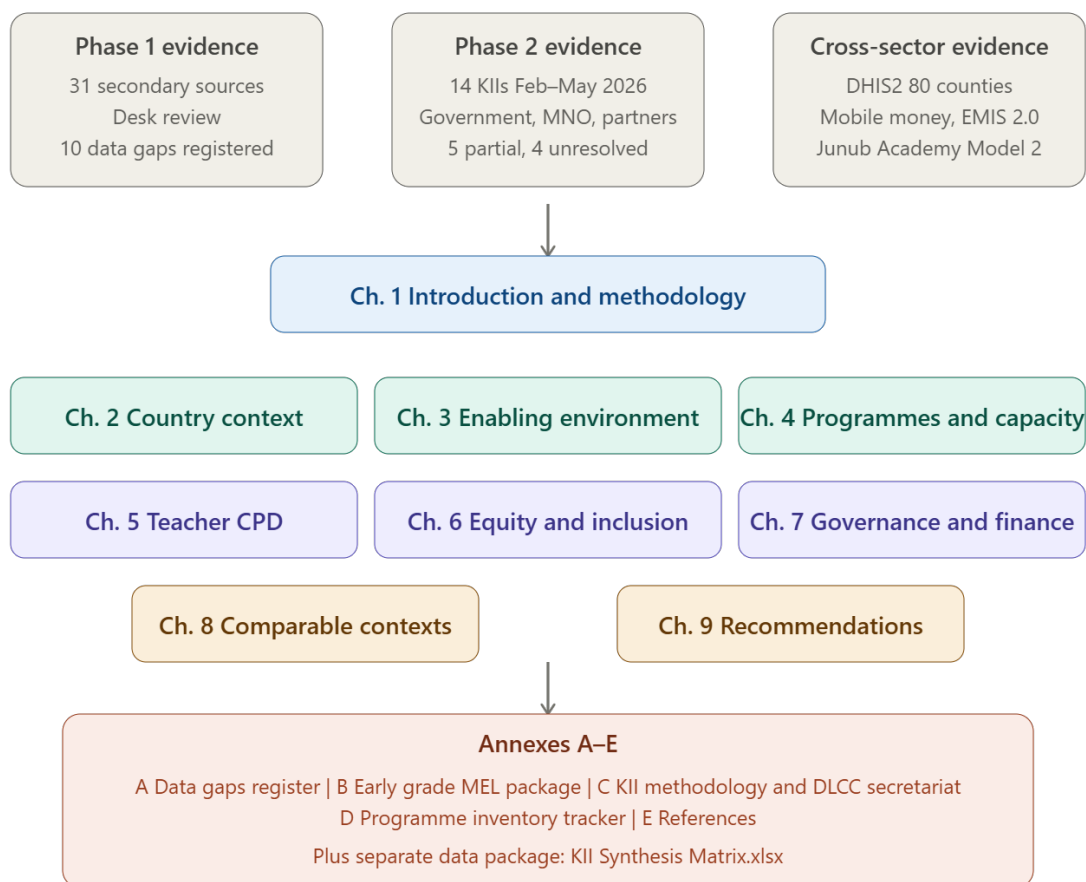


Figure 2: Indicative cost per child per year by digital learning modality (proxy figures, comparable fragile contexts). Bars = midpoint; bands = min–max range. South Sudan-specific unit costs to be commissioned in Phase 1. Source: Desk Review §8.2; Education Development Trust (2021); EdTech Hub (2023).

Figure 3: Analytical Architecture of this Report. The diagram maps the report's nine substantive chapters against their evidence sources: Phase 1 desk review (31 documents) informs Chapters 2, 3, 4, 7 and 8; Phase 2 KII evidence (7 primary interviews, 7 secondary desk reviews) informs Chapters 3, 4, 5, 6 and 8; both phases jointly inform Chapter 9 (Six Principles), Chapter 10 (Risk Register) and Chapter 11 (Strategic Roadmap). The analytical framework applies six dimensions consistently across all evidence streams: delivery conditions, programme capacity, facilitation and teacher CPD, equity and inclusion, governance and financing and comparable-context evidence.

Report architecture: nine chapters, three evidence streams



Guided recommendations

Ten guided recommendations consolidate the analysis into decisions. Each is tied to an owner and a delivery phase, and each restates, in actionable form, a commitment developed across Chapters 7 to 13.

1. Establish and gazette the DLCC as a MoGEI task force within 90 days of this report's finalization, delegating its technical functions to a National Research and Education Network (NREN) working group nested in MoICT's digital-transformation structure (MoGEI and MoICT; Phase 1).
2. Map MoICT's mandate and the national digital-policy instruments, and route every infrastructure, interoperability and data-protection question through them rather than through education policy alone (DLCC and MoICT; Phase 1).
3. Secure a USAF implementation agency and designate digital learning a priority expenditure category, converting the 2 per cent MNO levy into a recurrent domestic financing stream (NCA, MoICT and MoGEI; Phases 1 to 3).

4. Operationalize the content quality-assurance checklist within 90 days of DLCC establishment and suspend distribution of unreviewed content (MoGEI NCDC Technical Review Committee; Phase 1).
5. Commission ALP EGRA/EGMA baselines to close the critical learning-outcomes gap before any scale-up decision (MoGEI and UNICEF; Phase 1).
6. Stand up the telecom-integrated complementary model, pairing zero-rated platform access with zero-rated USSD/SMS, and build outcome tracking into it from inception (DLCC and MNOs; Phase 2).
7. Build EMIS 2.0 on the DHIS2 offline-first architecture for emergency-tolerant education data, co-financed with health at county level (MoGEI EMIS Unit; Phase 2).
8. Establish a population-level teacher digital-skills baseline and competency framework before allocating CPD investment (MoGEI and UNESCO; Phase 1).
9. Make gender-disaggregated reporting a non-negotiable data standard at every digital pilot site (DLCC; Phase 2).
10. Map existing partners, including Jesuit Worldwide Learning and its Humanitarian eLearning Platform, into the DLCC register and the common content and reporting standards (DLCC; Phase 1).

1. Introduction and methodology

1.1 Background and purpose

This analysis provides the evidence base for determining how digital learning can extend access, strengthen teaching and improve foundational learning outcomes within South Sudan's specific constraints. It was requested by MoGEI and commissioned by UNICEF South Sudan under the GPE-TESS Programme to inform technology-facilitated learning investments, programme design and sector coordination.

Education delivery in South Sudan operates under compounded structural constraints. Electricity access is 7.2 per cent nationally. Internet penetration stands at 15.8 per cent. Household device ownership is 12–20 per cent nationally and considerably lower in rural areas where 78.2 per cent of the population lives. Seventy per cent of primary teachers have no formal training. The national primary pupil-teacher ratio is 93:1. Disruption from conflict, displacement, flooding and food insecurity is recurrent across multiple states.

Technology-Facilitated Learning (TFL) must be assessed as a practical delivery option within that constrained system, not as a standalone initiative that can operate independently of it. Any modality that depends on household internet access, individual device ownership or stable electricity as baseline conditions will not reach most South Sudanese learners. That design failure is not recoverable through better content or stronger facilitation.

The analysis serves four audiences and four corresponding purposes. For MoGEI, it provides the evidence base for establishing the Digital Learning Coordination Committee (DLCC) and setting content quality standards. For UNICEF, it informs GPE-TESS Phase 2 programme design, particularly the modality selection and monitoring, evaluation and learning (MEL) framework. For development partners (World Bank, United States Agency for International Development (USAID), Foreign, Commonwealth & Development Office (FCDO) and European Union (EU)), it identifies co-financing opportunities and flags where separate digital learning investments can align under the DLCC rather than operating as parallel programmes. For MNOs (MTN South Sudan, Zain, Digitel), it establishes the commercial and regulatory framework for zero-rating, USSD service delivery and social good data tier arrangements.

This analysis is situated within the global Sustainable Development Goal 4 (SDG 4) framework. SDG 4.1 commits to ensuring that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes by 2030. SDG 4.5 requires eliminating gender disparities and ensuring equal access to education for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations. SDG 4.a mandates building and upgrading inclusive and effective learning environments, including those that are child-, disability- and gender-sensitive, providing appropriate and effective digital learning infrastructure. South Sudan's reported progress against SDG 4 indicators a Grade 3 EGRA correct score of 39.1 per cent, a 59 per cent out-of-school rate for the school-age population and near-absent school-level electricity at 2 per cent defines the scale of the gap this analysis addresses. The African Union (AU) Digital Education Strategy 2023–2028, which South Sudan has endorsed, provides the regional operationalization of SDG 4.a explicitly recommending the creation of offline functionalities for e-learning platforms to enhance access in disconnected remote areas. This analysis treats those AU commitments as the minimum design standard for any modality proposed for national deployment.

1.2 Scope and analytical focus

The analysis covers the full spectrum of technology-facilitated learning modalities operating or proposed in South Sudan, from radio broadcast and SD card distribution at the low technology end to satellite connected community hubs and digital teacher CPD platforms at the high end. It assesses each modality against six analytical dimensions: (1) delivery conditions, (2) programme and system capacity, (3) facilitation and teacher digital capacity, (4) equity and inclusion, (5) governance and financing and (6) comparable context evidence.

An offline-first lens applies throughout. No recommendation assumes connectivity, household device ownership or stable electricity as baseline conditions unless Phase 2 evidence confirms otherwise for a specific geographic or institutional context. Teacher CPD is treated as a cross-cutting theme embedded across Chapters 3, 4, 5 and 7 rather than confined to a standalone section. This design choice reflects the evidence that facilitation quality is the primary predictor of learning gains across all modalities, making CPD a dimension of every chapter rather than an isolated programme component.

The geographic focus is national, with state-level disaggregation where data permits. Priority attention is given to the states with the highest concentrations of out-of-school children (Unity at

82 per cent, Jonglei at 81 per cent, Warrap and Northern Bahr el Ghazal) because these states also have the weakest digital infrastructure and any modality proposed for national deployment must be tested against their conditions first.

1.3 Methodology: Two-phase sequential design

The sequential approach means Phase 2 (primary data collection) was designed to fill specific gaps identified in Phase 1 (secondary data review), rather than running both phases in parallel. This design choice is deliberate: it concentrates limited KII time on the evidence gaps that matter most for decision quality.

1.3.1 Phase 1: Desk review

Phase 1 comprised a secondary data review conducted between February and April 2026. Of 47 documents identified through structured searches of UNICEF, GPE, UNESCO, World Bank and implementing partner repositories, 31 were included based on relevance, data quality and currency. Sources included published programme evaluations (Cambridge Education, 2018), national policy documents (MoGEI, 2023), regulatory and market data (BuddeComm, 2025; GSMA Intelligence, 2025; DataReportal, 2026), cross-sector digital deployment evidence (DHIS2, mobile money) and assessment data (Montrose International, 2016; RTI International & OPM-Cynosure, 2017).

The desk review produced five key findings, identified ten data gaps ranked by priority and generated an initial KII sampling frame of seven interviews. This sampling frame was subsequently expanded to thirteen interviews based on a structured gap analysis against the ToR's six scope dimensions (digital infrastructure, devices, content, teacher capacity, stakeholder ecosystem and governance). The MoH DHIS2 data were added as the evidence in response to UNICEF feedback, recognizing that DHIS2 represents the closest analogue to a population scale offline-first digital deployment in South Sudan.

1.3.2 Phase 2: Key informant interviews

Seven primary KIIs were conducted between February and May 2026 with direct interview respondents: government counterparts (MoICT and five MoGEI units), private sector operators (MTN South Sudan and Zain South Sudan), Educare, Save the Children and the World Bank. An additional seven stakeholders – NCA, RTI International & OPM-Cynosure, UNESCO, WPDI, MoH/DHIS2 and IRC/NRC – were researched through secondary desk review: document analysis of annual reports, programme evaluations, technical frameworks and published datasets. These are cited as secondary research sources throughout rather than as primary KII testimony. Together, the primary and secondary evidence streams address all fourteen data collection pathways originally planned.

Each KII was structured around the specific data gaps it was designed to address. A total of 53 questions were administered across the seven primary KIIs. The KII question guides were tailored to each respondent's institutional knowledge: the NCA secondary review focused on site-level MNO data and USAF implementation status; the MoGEI Curriculum Division interview

focused on content quality assurance processes; the MoH DHIS2 secondary review focused on the county hub model's operational architecture and transferability to education.

KII data were synthesized through a five KII Synthesis Matrix (submitted as part of the Data Package). Sheet 1 maps all 53 questions to the ten data gaps and records what the evidence shows, the gap resolution status and contradictions to flag. Sheet 2 cross analyses the six analytical dimensions by what KII data adds to the desk review. Sheet 3 provides an updated programme inventory tracker. Sheet 4 records six identified contradictions between KII sources. Sheet 5 compiles 49 verified statistics with citation formats for direct use in the report.

1.3.3 KII sampling rationale

The sampling design combined primary KIIs with secondary desk research across fourteen stakeholder pathways. The original plan covered key infrastructure and programme stakeholders (NCA, MTN, Zain, RTI, MoGEI ALP, Save the Children, UNESCO). A structured gap analysis identified that Data Gaps 3, 7, 9 and 10 required additional evidence from Save the Children MoGEI EMIS, MoGEI Curriculum Division, MoGEI Teacher Management and MoICT, all conducted as direct primary interviews. World Bank evidence was also drawn partially from the published DE4A assessment (2022/2025). NCA, RTI/OPM, UNESCO, MoH/DHIS2, IRC/NRC and WPDI were addressed through secondary desk research: their published reports, programme documents and technical datasets provided the evidence base for the relevant data gaps rather than direct interview testimony. WPDI's operational data site counts, usage statistics, per-site costs and learning outcomes did not appear in any reviewed document, meaning that data gap remains unresolved.

1.3.4 Analytical framework

Both phases are organized around six analytical dimensions corresponding to the report's chapter structure. Each dimension was assessed using a consistent framework: (a) what the desk review established, (b) what the KII evidence adds, corrects or contradicts, (c) the teacher CPD angle within that dimension and (d) the implications for modality selection and programme design.

Scores were updated following Phase 2 KII evidence, the most significant change being the USSD score upgrade from 5 to 7 following confirmation of the MTN zero rating MoU.

1.4 Data quality and limitations

This analysis draws on four classes of evidence, treated distinctly throughout. Published evidence (peer-reviewed studies, evaluations and technical reports) carries the highest evidentiary weight. Administrative data (EMIS, NCA and operator records) is treated as official but subject to coverage gaps. Key informant testimony is cited as personal communication and reported as informant evidence, not verified fact. Author interpretation is signalled separately, and every critical figure is traceable to a named source in Annex D. Where sources conflicted, the contradiction was logged in the KII Synthesis Matrix contradiction register and adjudicated in favour of the higher-tier source, with the disagreement recorded rather than smoothed over.

Four principal limitations apply to this analysis.

First, KII evidence is informant-reported and subject to institutional positioning. Six contradictions between KII sources were identified and are documented in the KII Synthesis Matrix Contradiction Register (Sheet 4). The most consequential contradiction concerns electricity access: BuddeComm 2025 reported approximately 40 per cent national coverage, while the World Bank DE4A assessment found 7.2 per cent and the EMIS 2021 school census recorded 2 per cent of schools with reliable electricity. The report uses the DE4A 7.2 per cent figure as the national baseline and the EMIS 2 per cent figure as the school-level baseline, on the grounds that the DE4A assessment was conducted with more rigorous methodology and was corroborated by NCA's published Annual Report and Spectrum Audit data.

Second, of ten data gaps identified in Phase 1, none were fully closed by KII evidence. Six achieved partial resolution, three remain unresolved and one (Gap 10, audio content unit costs) was partially addressed through quality data rather than cost data. Gap 9 (teacher digital skills baseline) was upgraded from UNRESOLVED to PARTIAL through integration of Digital 2026 proxy indicators; a population-level teacher assessment remains absent. The three unresolved gaps (Gap 4: ALP learning outcomes; Gap 5: South Sudan-specific unit costs; Gap 8: WPDI satellite site data) represent active decision risks that constrain Phase 2 planning. These are discussed in Chapter 10.

Third, Multiple Indicator Cluster Survey (MICS) 2025 data were not available during the Phase 2 KII period and will be integrated in the final report. The GESP 2023–2027 uses 2021 baselines that may understate current conditions given displacement dynamics between 2021 and 2026. An updated OOSC estimate from MICS 2025 is a priority integration task before any scale-up decision is cited against the current 2.8 million baseline.

Upon availability of MICS 2025 data, the following statistics must be updated before this document is submitted for final publication: (1) total school-age population estimate (currently 4.75 million, based on 2021 EMIS); (2) out-of-school children total (currently 2.8 million, based on 2021 baselines); (3) gender disaggregation of out-of-school children (currently 53 per cent girls, based on 2021 data); (4) displacement population figures (currently UNHCR 2024). All four are flagged as requiring update. Decisions on ALP and county hub scale-up in Phase 3 must not be cited against the 2021 OOSC baseline if MICS 2025 data show materially different figures.

Fourth, WPDI's operational data confirmed site count, usage statistics, per site Intelsat connectivity costs and learning outcomes are not available in any published document reviewed during the desk research phase. This means that satellite community hub cost-effectiveness cannot be assessed on evidence. The Tier 3 conditional classification for VSAT modalities is a direct consequence of this absence.

2. Country context and the learning crisis

South Sudan's digital learning agenda must start with the learning crisis, not with what technology can theoretically offer. The system serves a young, predominantly rural population:

an estimated 78.2 per cent live outside urban centres. Approximately 2.8 million school age children, roughly 59 per cent of the estimated 4.75 million school-age population, are out of school. Girls account for approximately 53 per cent of out-of-school children. Active humanitarian conditions persist across multiple states; Jonglei, Warrap, Greater Pibor and Unity face the heaviest operational pressure.

Quality is an equally urgent concern. The GESP 2023–2027 identifies a Grade 3 EGRA baseline of 39.1 per cent correct, meaning the average enrolled Grade 3 learner answers fewer than four in ten foundational literacy questions correctly. Numeracy is stronger at 69.0 per cent EGMA, but the gap between in-school status and foundational competency is the defining challenge for any digital learning investment. Technology can accelerate that gap or narrow it; the design choices made now determine which.

2.1 Population and education indicators

South Sudan's population of approximately 12.04 million (DataReportal, 2025) is one of the youngest in the world, with a median age of 18.7 years. This demographic profile means that the school age cohort is proportionally very large relative to the working age population, and the demand for educational services far exceeds the system's current supply capacity. The estimated 4.75 million school age children represent roughly 39 per cent of the total population.

Poverty is near-universal. Approximately 80 per cent of the population lives below the international poverty line of USD 1.90 per day (World Bank, 2018 most recent available estimate; likely understates current conditions given conflict and displacement dynamics 2021–2026). Adult literacy stands at approximately 35 per cent (age 15+), with significant gender and rural-urban disparities. These two indicators, poverty and adult literacy, are the primary contextual constraints on any digital learning strategy. Parents with limited literacy cannot support technology mediated home learning. Households in extreme poverty cannot absorb device costs, data costs or the opportunity cost of children's time spent on education rather than labour.

2.2 Learning baseline: EGRA/EGMA evidence

The most substantive early grade learning data comes from assessments conducted by Montrose International (2016) and the GPEP evaluation (2015–2018). The Montrose diagnostic, administered across nine states at P3, found that 45 per cent of learners scored zero on reading comprehension, meaning they could not answer a single question about a passage they had just read. Ninety-two per cent could not sound out a single letter. Seventy-five per cent could not read any word in a national language. These are not low scores; they indicate that a large proportion of enrolled P3 learners have not yet reached the starting line of functional literacy.

Numeracy results were stronger. One per cent of P3 learners scored zero on number identification, meaning 99 per cent could identify at least one number. The GPEP evaluation subsequently recorded 80 per cent pass rates at baseline and 93 per cent at endline for number identification, suggesting that numeracy instruction is reaching more learners than literacy instruction. This differential has implications for digital content design: numeracy-focused digital

interventions may yield faster gains than literacy interventions, which face a deeper baseline deficit.

A critical methodological caution: the GPEP 2018 endline recorded a drop in reading comprehension to 17 per cent from a 43 per cent baseline. The RTI International & OPM-Cynosure evaluation report confirmed that this reflected more rigorous randomized sampling at endline, not programme regression (RTI International & OPM-Cynosure, 2017). The baseline had used teacher-selected student samples, which produced inflated scores. Some assessment sites in Lakes State recorded 100 per cent pass rates at baseline, a statistical impossibility under genuine randomization. This history has a direct implication for Phase 2 MEL design: randomized student selection at all EGRA/EGMA assessment points must be mandatory, and teacher selected sampling must be explicitly prohibited in the Phase 2 MEL framework.

2.3 Out-of-school children: State-level concentration

OOSC are not evenly distributed across South Sudan's ten states and three administrative areas. Unity State records the highest rate at 82 per cent of children aged 6–13 out of school; Jonglei follows at 81 per cent. These two states, along with Warrap and Northern Bahr el Ghazal, account for the greatest concentration of unserved learners and the most acute infrastructure deficits.

This geographic concentration matters for modality design. A digital learning programme with national reach ambitions that performs well in Juba (4G coverage, 80 per cent+ mobile broadband, reliable electricity) but cannot operate in Unity (2G mostly, 15–25 per cent mobile broadband, no grid electricity) has not solved the problem. It has served the population that already has the most educational options while bypassing the population with the fewest. The modality selection framework in this report applies a 'Unity/Jonglei design test': any proposed modality must be assessed against the infrastructure conditions of the two states with the highest OOSC rates before it is classified as a primary reach vehicle.

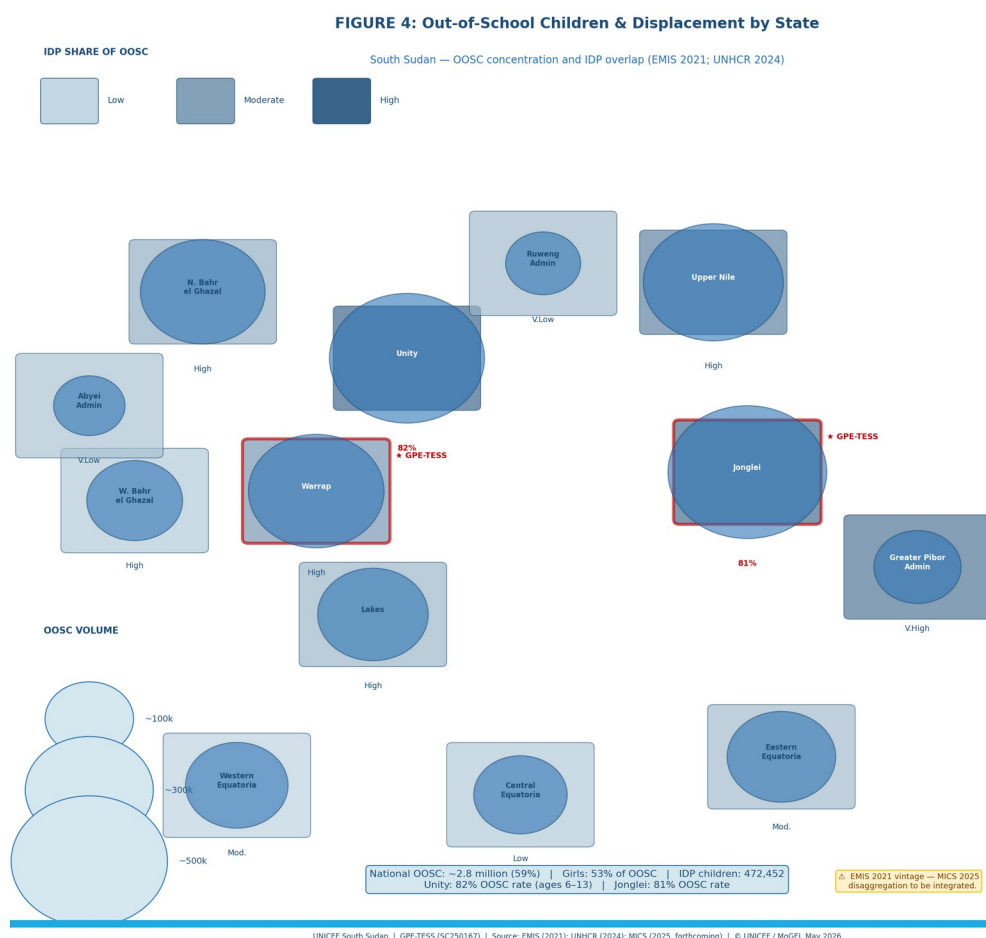


Figure 4: Distribution of out-of-school children and internally displaced children by state, South Sudan. OOSC: EMIS 2021; IDP: UNHCR 2024. States with highest OOSC rates (Unity 82 per cent, Jonglei 81 per cent) also have weakest coverage (17–20 per cent). Source: MoGEI/UNICEF EMIS (2021); UNHCR (2024); MICS (2025, forthcoming).

The equity implications of this geographic concentration are not self-evident from the percentages alone and require direct articulation. Unity State's 82 per cent OOSC rate means that eight out of ten children who should be in school are not. That is not a system under strain. That is a system that has, for those children, effectively ceased to exist. Any digital learning modality proposed for Unity must answer a prior question: does it reach a child who is not in school, has no device, has no household electricity and whose nearest functioning school may be inaccessible during the July-October flood season? If the answer is no, the modality cannot be classified as serving the population most in need, regardless of how it performs in Juba. The modality selection logic in Chapter 3 is built on this distinction, treating Unity and Jonglei as the design standard rather than the edge case. A one-size-fits-all approach whether it defaults to a web platform, a tablet centre or a VSAT hub is calibrated for the best-served populations and systematically excludes the worst-served ones. The analysis that follows does not recommend any such approach. Each modality recommendation is explicitly conditional on the infrastructure conditions of the states where most unserved learners are concentrated.

The 472,452 internally displaced children (UNHCR, 2024) add a further layer of complexity. Displacement is concentrated in the same states with the highest OOSC rates: Jonglei, Unity, Warrap and Upper Nile. IDPs do not have fixed addresses, cannot be reliably tracked through EMIS registration systems and may move multiple times within an academic year. Any digital learning modality that requires fixed-location infrastructure (tablet centres, VSAT hubs) or address-linked enrolment cannot serve this population as its primary channel.

2.4 Displacement, flooding and seasonal disruption

South Sudan's education calendar is disrupted annually by flooding, which in recent years has affected Jonglei, Unity and Upper Nile most severely. The 2024 floods displaced an estimated 1.4 million people across multiple states. Education on Air II radio content was redeployed to flood-affected areas as an emergency measure, and 3,000+ USB sticks with audio lessons were distributed to schools in affected zones. This response demonstrated both the value and the limitations of the existing content: radio and USB content can be deployed rapidly to emergency settings, but the content quality issues identified in this analysis (65 per cent rated low quality) mean that emergency deployment distributes the same low-quality content at speed.

Seasonal flooding is not a temporary disruption; it is a recurring structural condition that any digital learning system must be designed around. A system that works well from January to June but fails during the July–October flood season is not a viable national system. Content designed for emergency redeployment must exist as a standing inventory, pre-reviewed for quality, available in national languages and stored on SD cards that can be distributed without requiring logistics chains that fail during floods.

2.5 Teacher workforce

South Sudan's teaching workforce is the most constrained element of the education system, and the one most consequential for digital learning design. Nationally, 70 per cent of primary teachers have no formal training (UNESCO South Sudan, 2022; Teacher Management Directorate, MoGEI, personal communication, March 2026). Forty per cent are volunteers or part-time staff (UNESCO South Sudan, 2022). The national primary PTR stands at 93:1, with significantly higher ratios in Jonglei and Unity where the OOSC crisis is most acute.

Most rural teachers have minimal prior exposure to digital tools. A significant proportion are Arabic speakers in states where Juba Arabic is the de facto classroom language, while formal curriculum materials are produced in English and in national languages (Bari, Dinka, Nuer, Zande, Toposa). The language barrier compounds the digital skills gap: a CPD module delivered in English to a teacher whose working language is Juba Arabic or Dinka faces both a digital literacy barrier and a language barrier simultaneously.

The strategic implication is direct: CPD channel design cannot assume foundational digital literacy, consistent internet access or English language proficiency. Pictorial job aids, audio-guided instruction and school-based mentoring are not enhancements to CPD; they are the required design standard for 70 per cent of the target workforce. Any CPD model that does not

meet this standard will exclude most teachers it claims to serve. The DHIS2 deployment solved exactly this problem for health workers through pictorial job aids and continuous onsite mentoring, and that model is directly transferable to education CPD design.

Salary delays are the single greatest driver of teacher absenteeism, a structural constraint confirmed across multiple KII sources (MoGEI Teacher Management, Save the Children, UNESCO). A CPD model that depends on teacher attendance at fixed-schedule training events will underperform in states where salary delays drive irregular attendance. Digital reinforcement through zero-rated platforms (Junub Academy teacher resources, available since March 2026) and asynchronous channels (WhatsApp-based vTLC circles, as piloted by IRC in Central Equatoria) is not a convenience feature; it is the design response to a workforce that cannot reliably attend scheduled events due to salary driven absenteeism.

3. Enabling environment for digital learning

South Sudan's digital infrastructure is more uneven than absent. The distinction matters for programme design: the challenge is not zero capacity but highly concentrated capacity that mismatches the geographic distribution of educational need. Juba and state capitals have 4G connectivity, commercial broadband and electricity access that supports web-based platforms. Rural areas where 78.2 per cent of the population lives, and where the majority of OOSC are concentrated, operate under fundamentally different conditions: 2G coverage at best, no grid electricity and device ownership below 8 per cent.

The single most significant data correction from Phase 2: electricity access stands at 7.2 per cent nationally, not 40 per cent as reported in the BuddeComm 2025 proxy used in the desk review. This figure was corrected by the World Bank DE4A assessment and corroborated by NCA's published Annual Report and Spectrum Audit data. The EMIS 2021 school census records an even lower figure: 2 per cent of schools with reliable electricity. The strategic implication is significant: off-grid solar power is a required component, not an optional enhancement, for any digital learning deployment outside Juba. A device procurement plan that does not include solar charging infrastructure is not a viable plan for South Sudan.

3.1 Mobile network operator coverage

Three MNOs hold licences in South Sudan. MTN South Sudan dominates with 62 per cent market share and 2.06 million subscribers, operating 394 2G, 350 3G and 165 4G base station sites (National Communication Authority [NCA], 2021). Zain South Sudan holds 38 per cent market share with an estimated 1.26 million subscribers, operating 265 2G, 121 3G and 73 4G sites. Digitel, a newer entrant, holds approximately 3.4 per cent market share and is currently limited to Juba and Central Equatoria, with an estimated 40 sites across all technologies.

These site counts are from 2021 NCA records, the most recent granular data available. State level population coverage percentages are not publicly available at investment grade resolution (Data Gap 1: partial). The NCA confirmed in the March 2026 KII that it publishes site counts but not population coverage percentages because the population denominators per state are

unreliable given displacement dynamics. This means that all state level coverage estimates in this report are proxies derived from site density and MNO operational reports rather than confirmed population coverage figures.

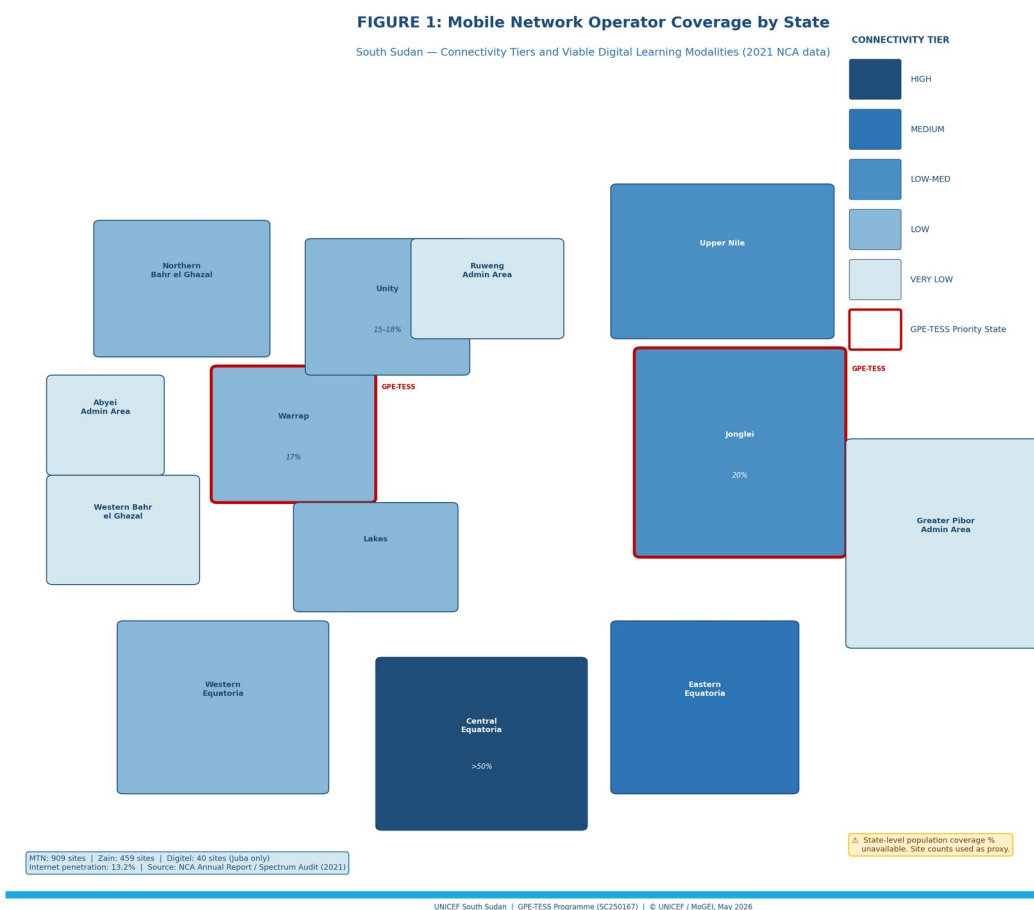


Figure 5: Mobile network operator coverage by state, South Sudan (2021 NCA data). Confirmed broadband: Jonglei 20 per cent, Warrap 17 per cent. MTN: 909 sites; Zain: 459 sites; Digitel: 40 sites (Juba). Source: NCA Annual Report / Spectrum Audit (2021); MTN KII (March 2026); Zain KII (March 2026).

The MTN device split is revealing. Of 2.06 million MTN subscribers, 691,000 (33.5 per cent) use smartphones and 1,371,000 (66.5 per cent) use feature or basic phones (MTN South Sudan, personal communication, March 2026). Of the 691,000 smartphone owners, only 588,000 are active data subscribers. The gap between device ownership and data usage is significant: owning a smartphone does not mean using data services. High data costs (approximately 15 per cent of monthly gross national income (GNI) per capita for 1GB) suppress active data usage even among device owners. This gap directly affects the viability of app-based or web-based digital learning modalities: the addressable population for such modalities is approximately 588,000 active data subscribers, not the 691,000 smartphone owners or the 2.06 million total MTN subscribers.

3.2 State-level infrastructure and modality implications

Coverage data translates directly into modality decisions. The states with the highest OOSC concentrations are also the states with the weakest mobile broadband infrastructure. This is not a coincidence; it reflects the same structural conditions that drive both educational exclusion and infrastructure underinvestment.

Central Equatoria (Juba) has the strongest infrastructure: 4G/3G coverage, estimated 80 per cent+ mobile broadband penetration, fibre and microwave backhaul. All tiers are viable in Juba, including web platforms, USSD, tablet centres and satellite hubs. Western and Eastern Equatoria have medium coverage (35–60 per cent mobile broadband, 3G/2G, microwave/satellite backhaul) where Tier 2 modalities are viable with facilitation support and Tier 1 modalities serve as the backbone.

Jonglei and Unity, the two highest-OOSC states, have low coverage: predominantly 2G, estimated 15–25 per cent mobile broadband, satellite or microwave backhaul that is intermittent. Only Tier 1 modalities (radio + SD card) have structural reach in these states. No USSD-based or internet-dependent modality should be proposed as a primary reach vehicle for Unity or Jonglei. Warrap (approximately 17 per cent mobile broadband, 2G mostly) and Northern/Western Bahr el Ghazal (15–20 per cent mobile broadband, 2G, satellite backhaul) face similar conditions. Upper Nile and Lakes have low-to-medium coverage (25–40 per cent) where selective Tier 2 pilots with solar infrastructure are feasible.

Table 2: State-Level Infrastructure and Modality Viability summarize these conditions. The practical implication: a national digital learning programme that deploys different modalities in different states based on infrastructure conditions is not an equity compromise; it is an equity requirement. Deploying the same modality everywhere would mean either choosing a high-tier modality that excludes Unity and Jonglei or choosing a low-tier modality that underuses the infrastructure available in Juba and the Equatorias. The tiered approach in this report is designed to match modality to infrastructure while maintaining learning outcome measurement as the common standard across all tiers.

This infrastructure-modality mapping is fundamentally an equity map. The states where digital delivery is technically easiest Central Equatoria, Western Equatoria are also the states with the lowest OOSC concentrations. The states where it is technically hardest Unity, Jonglei, Warrap carry the highest concentrations of unserved learners. That inverse correlation is not incidental. The same structural conditions that keep children out of school (conflict, flooding, displacement, extreme poverty, distance) also depress investment in digital infrastructure. A programme strategy that deploys modalities where infrastructure is best will reach approximately 20-25 per cent of the learner population that already has the most educational options. It will bypass the 75-80 per cent who do not. The tiered approach in this report corrects for this alignment problem by making infrastructure conditions the primary variable in modality selection rather than a constraint to be noted and then ignored. Urban-rural disaggregation is therefore not a technical footnote in this analysis; it is the analytical axis on which every investment decision turns.

State / Group	Coverage Level	Est. Mobile Broadband	Viable Modalities	Design Test
Central	High	80%+ (4G/3G, fibre)	All tiers: web platform,	Supplementary

Equatoria (Juba)			USSD, tablet centre, VSAT hub, radio + SD card	reach; not the primary problem
Western & Eastern Equatoria	Medium	35–60% (3G/2G, microwave/satellite)	Tier 1 backbone; Tier 2 viable with facilitation and solar	Pilot zone for Tier 2 models before Unity/Jonglei extension
Upper Nile, Lakes	Low–Medium	25–40% (2G/3G, intermittent)	Tier 1 primary; selective Tier 2 pilots with solar feasible	Transitional; assess after Equatoria pilots produce data
Warrap, N/W Bahr el Ghazal	Low	15–20% (2G, satellite backhaul)	Tier 1 only (radio + SD card). No USSD or internet-dependent modality as primary reach	Phase 2 county hub sites (Warrap confirmed)
Jonglei, Unity ★ Design Test	Low	15–25% (2G, intermittent satellite)	Tier 1 only. OOSC rates: Unity 82%, Jonglei 81%. Any modality proposed for national reach must function here	Phase 2 county hub site (Unity confirmed)

Table 2: State-Level Infrastructure and Modality Viability. ★ = Unity/Jonglei Design Test row: any modality proposed for national deployment must function under these conditions. Sources: NCA Annual Report / Spectrum Audit 2021; MTN KII, March 2026; MoGEI EMIS 2021; World Bank DE4A 2022.

3.3 Affordability and device access

High device and data costs are the second-largest infrastructure barrier after electricity. A 1GB data bundle costs approximately 15 per cent of monthly GNI per capita, among the most expensive in Sub-Saharan Africa relative to income (World Bank, 2022; ALP Unit, MoGEI, personal communication, March 2026). A 20 per cent import tax and 25 per cent National Bureau of Standards (NBS) type-approval fees add an estimated 45 per cent to the landed cost of tablets and smartphones (MTN South Sudan, personal communication, March 2026). For a household living below USD 1.90/day, a feature phone at USD 15–25 represents several weeks of income. A smartphone at USD 80–100 is functionally unaffordable. A tablet at USD 100–200 is out of reach entirely without institutional procurement.

These cost barriers mean that any digital learning strategy premized on individual device ownership will reach the already connected minority, not the unserved majority. Institutional procurement (school level or centre level devices) and shared-access models (community digital hubs, classroom-level devices) are the only viable pathways for reaching learners whose

households cannot afford personal devices. The Junub Academy Model 2 design (offline server + projector + classroom viewing) is a shared access model that works precisely because it does not require individual device ownership.

The MTN-MoGEI-Educare zero-rating MoU, signed 10 March 2026, addresses the data cost barrier but not the device cost barrier. Zero rating means that accessing the Junub Academy platform does not consume data allowances for MTN subscribers. This is significant for the 588,000 active MTN data subscribers, but it does not extend the addressable population beyond those who already own smartphones and have activated data services. Zain has approved zero-rating for the Junub Academy platform in principle (Zain South Sudan, personal communication, March 2026); operational implementation status should be verified directly with Zain before the Phase 1 MNO operationalization action (Chapter 11.1, Action 3) can be marked as complete.

A government communique signed by 26 Ministers in September 2024, witnessed by the Vice President, mandates MNO integration of e-learning. This provides NCA with the regulatory legitimacy to formalize zero-rating as a public benefit arrangement rather than a voluntary corporate social responsibility initiative. The communique's existence means that zero-rating is not dependent on individual MNO goodwill; it has a political mandate that NCA can enforce through its regulatory authority.

3.4 Universal service access fund (USAF)

The USAF was established in 2020 under the National Communication Act (2012) and collects 2 per cent of annual ICT licensee revenue. USD 9 million was approved in June 2025 for the design of a national fibre backbone (NCA, 2021). Education is explicitly an eligible category for USAF funding under the AU Digital Education Strategy framework, which South Sudan has endorsed.

The critical constraint is institutional, not financial: the USAF currently has no implementation agency. It collects revenue and publishes performance reports but cannot directly execute projects. Establishing an implementation mechanism (a USAF board with procurement authority, or delegating implementation to an existing government agency) is a precondition for USAF to serve as a digital learning financing vehicle. Without this mechanism, the USD 9M fibre allocation remains undeployable for education connectivity subsidies, device procurement or school bandwidth support, regardless of political commitment or eligible expenditure categories.

For digital learning specifically, USAF could fund three categories of investment if the implementation mechanism is established: school connectivity subsidies in state capitals and county towns (where fibre or microwave backhaul exists), device procurement subsidies for institutional use (school level tablet sets with solar charging) and bandwidth cost-sharing for zero-rated educational platforms. Each of these would require education to be specified as a priority category in the USAF implementation mandate, not merely as an eligible category.

3.5 The DHIS2 precedent: Offline-first at scale in South Sudan

DHIS2's operational footprint is the single most important cross-sector reference for digital learning design. The system covers all 10 states and 80 counties, with 1,162 functional facilities reporting as of early 2026 (World Health Organization & Ministry of Health South Sudan, 2025). The model operates at county health department (CHD) level: designated data entry hubs equipped with Android tablets, solar charging cabinets, offline-first synchronization logic and county health officers serving as digital entry points.

The DHIS2 team confirmed in the April 2026 KII that the system's health information system (HIS) maturity score is 40.5 per cent, classified as 'Minimal' on the WHO assessment scale. This is not a mature system by global standards, but it is the only digital data system that operates at national scale in South Sudan under actual field conditions. Its achievements and its limitations are both instructive for education.

The key operational features relevant to education are: first, offline-first synchronization means data are entered on tablets without connectivity and synchronized when a connection becomes available (typically weekly or monthly, via the GSM (Global System for Mobile Communications) network). This is the architecture that education data collection (EMIS, learning assessment) and content delivery (offline tablets) must replicate. Second, solar charging cabinets mean that devices operate without grid electricity, addressing the 7.2 per cent national electricity access constraint directly. Third, pictorial job aids mean that low-literacy users can operate the system without reading fluency, addressing the adult literacy constraint (35 per cent nationally). Fourth, the Granular Site Management (GSM) supervision model means continuous onsite mentoring rather than one-off training workshops, addressing the CPD design challenge directly.

The county-level hub model is directly transferable to education. A 'County Digital Learning Hub' co-located with County Education Departments (CED), using the same hardware procurement logic (Android tablets, solar cabinets, power banks), the same offline-sync architecture and the same pictorial job aids for low-literacy users, would replicate proven functionality without requiring new-infrastructure investment. The DHIS2 KII team explicitly recommended co-financing with education at county level and should be built into the Phase 2 pilot design.

The transferability argument is not speculative. The DHIS2 team confirmed that the hardware stack (Android tablets at the USD 80 - 120 price point, solar charging cabinets at USD 200 - 400 per unit, power banks at USD 15 - 25) is already procured through established government supply chains. The offline sync architecture (Android app with local database, periodic sync via GSM when connection is available) is open source and adaptable. The supervision model (facility-level officers, daily data collection, weekly dashboards, pictorial job aids) is a staffing and training design, not a technology constraint.

3.6 Technical architecture for offline-first delivery: RACHEL, Raspberry Pi and Barefoot pedagogy integration

The offline-first design principle stated in this report requires more than policy intent: it requires a specified hardware-software stack that can operate without grid electricity, without internet connectivity and without a trained ICT technician on site. Two proven local-server platforms meet those conditions in comparable fragile-state contexts and are directly applicable to South

Sudan's County Digital Learning Hub model: the Remote Area Community Hotspot for Education and Learning (RACHEL) and the Raspberry Pi local server.

RACHEL is a portable offline server developed by World Possible, already deployed across more than 50 countries including Somalia, DRC and Kenya. A RACHEL-Pi unit uses a Raspberry Pi 4 (approximately USD 80) loaded with a preconfigured 64GB or 128GB SD card containing offline versions of Khan Academy (including KA Lite for low-powered devices), Wikipedia for Schools, CK-12 open textbooks and custom curriculum packages. The device creates a local Wi-Fi hotspot with a range of approximately 30-40 metres, enabling up to 30 simultaneous learner devices to connect without any internet access. In a school or County Education Centre (CEC) context, a single RACHEL-Pi serves an entire classroom of tablet-using learners or a computer lab. Total hardware cost per unit: USD 120-180, including enclosure and power supply. With a solar charging cabinet (USD 200-400, already procured through DHIS2 supply chains), the full RACHEL-Pi learning node costs USD 320-580 per site. This is between one-third and one-half the cost of a VSAT satellite hub per site, without recurring monthly connectivity fees.

The Raspberry Pi-based local server can also host Kolibri, the offline learning management system already in use by WPDJ at its satellite community centres (see Section 4.1.6). Kolibri supports content packaging in 39 languages (including French and Arabic, which are lingua franca for some South Sudanese learner populations), offline user management and progress tracking that can be synchronized when connectivity becomes available. The Learning Equality Foundation, which develops Kolibri, provides an active open-source community and South Sudan-specific content channels could be built through the DLCC content development pipeline recommended in Chapter 11.

The content pipeline for a RACHEL or Kolibri deployment follows a four-step process. First, the DLCC Content Quality Sub-Committee approves curriculum-aligned digital content packages using the QA checklist recommended in Section 4.2. Second, content is loaded onto master SD cards at the county level by a designated EMIS/digital hub officer. Third, field distribution to school-level devices occurs through the same logistics chain used for DHIS2 tablet distribution county health and education departments already share logistical infrastructure at county level in 76 of 80 counties. Fourth, progress data are extracted from Kolibri or RACHEL usage logs during the county officer's monthly school visit and fed into the EMIS 2.0 dashboard, providing the first school-level digital learning usage data in South Sudan's history.

Barefoot Pedagogy is a complementary instructional framework developed for resource-constrained contexts, premised on the principle that learning tools should be sourced from learners' immediate physical environment rather than shipped from outside. In South Sudan's context, Barefoot Pedagogy means that digital content is always paired with locally sourced physical materials: sand trays for letter and number tracing (addressing the 92 per cent of P3 learners who cannot decode a single letter), counting objects from the classroom or compound (stones, seeds, sticks) for numeracy and oral storytelling in national languages as the primary literacy scaffold before introducing text. This is not a fallback for when technology fails it is the instructional design principle that makes digital content effective for learners who lack prior exposure to text-based learning environments.

The Junub Academy Model 2 evidence from Warrap and Cueibet (pass rate improvements from 22.0 per cent to 71.0 per cent and 30.3 per cent to 75.5 per cent respectively) is best understood through a Barefoot Pedagogy lens: the dedicated facilitator at each session was not simply managing equipment. They were bridging between the video content on the offline screen and the physical, oral, community-anchored learning environment of secondary students in Warrap State. Extending this model to primary and ALP levels, where adult literacy is 35 per cent and learner literacy baselines are near-zero, requires the digital content to serve as one input alongside physical manipulatives, facilitator oral instruction and peer learning structures not as the primary instructional vehicle. The Phase 2 offline classroom pilot design should specify the ratio of digital-to-physical instruction time (a 50:50 split is the recommended starting point, adjusted based on Phase 2 EGRA/EGMA evidence) and require facilitators to demonstrate Barefoot Pedagogy techniques during the CPD certification process.

From a procurement and supply chain standpoint, RACHEL-Pi hardware costs are eligible for USAF device subsidy funding (see Section 3.4) once the USAF implementation mechanism is established. The unit cost profile USD 320-580 per offline learning node, with a 5-7 year hardware lifespan and negligible ongoing connectivity costs is significantly more favourable than any connectivity-dependent modality on a per-child-per-year basis in low-infrastructure states. Phase 1 procurement planning should request three RACHEL-Pi units for testing under Unity and Jonglei field conditions before Phase 2 scale-up. (World Possible / RACHEL, 2024; Learning Equality Foundation / Kolibri Technical Documentation, 2024; Save the Children, GPE-TESS Programme Documentation, Secondary Research.)

4. Digital learning programmes and system capacity

South Sudan has ten digital learning programmes or initiatives at various stages of implementation, planning or historical completion. The programme inventory reveals a consistent pattern: reach is tracked, learning outcomes are not. No programme operating at the primary or ALP level has published EGRA/EGMA-aligned learning outcome data. The one exception, the Junub Academy Model 2 offline classroom pilot, operates at secondary level and involves 204 students across two schools.

The emergence of Junub Academy as a nationally anchored platform, backed by a government MoU and confirmed zero-rating from MTN, is the single most significant development since the desk review. It did not appear in desk review sources at all. Its appearance in Phase 2, with pre-test/post-test data, equipment reliability testing and an active government MoU, represents a qualitative shift in the programme ecosystem.

4.1 Programme-by-programme analysis

4.1.1 Education on Air II (MoGEI / UNICEF / UNESCO / EDC)

Education on Air II (radio) is the largest-reach digital learning programme in South Sudan. During the COVID-19 school closures, the programme reached an estimated 1.5 million learners through radio broadcast, making it the only intervention that has achieved anything

approaching national scale. The programme currently operates in active mode, with content redeployed to flood-affected areas in 2024.

The radio broadcast component uses a talk-heavy format that does not meet the Interactive Radio Instruction (IRI) standard. IRI, used successfully in Somalia's Radio programme (UNICEF & BBC Media Action, 2020), builds structured facilitator prompts, student response pauses, singing, movement and verbal activity segments into the broadcast script. South Sudan's current radio content lacks these elements. The MoGEI Curriculum Division KII (Curriculum Division, MoGEI, personal communication, March 2026) confirmed that the scripts were designed for passive listening rather than interactive engagement, which partly explains why no learning outcome data have been produced despite wide reach.

The USB/SD card distribution component has distributed more than 3,000 devices loaded with 361 audio lessons to flood-affected and remote schools (Save the Children International, 2024). No exact distribution count was available from the programme's records at the time of this analysis; "3,000+" is the figure reported by the implementing partner, not an independently verified total. An exact count should be a standing item for the digital asset register proposed in Chapter 13.1.

One worked example of implementing partner activity in this category is the Educare South Sudan offline e-learning pilot, conducted March to June 2023 with Secondary Two cohorts in Warrap Senior Secondary School (Tonj North County, Warrap State) and Cueibet Senior Secondary School (Cueibet County, Lakes State). The pilot was co-funded by the Ministry of General Education and Instruction and Trinity Technologies Ltd (m-GURUSH), with the latter providing studio space and operational support — a configuration consistent with the PPP architectures discussed in Chapter 13.3. The evaluation used a quasi-experimental pre/post design with two experimental schools and two comparison schools. Posttest performance in experimental schools averaged 74.063 for boys and 71.640 for girls, against 30.808 and 28.693 in comparison schools, with no statistically significant difference between genders within the experimental arm (independent sample t-test, $t(32)=0.589$, $p=0.560$). The pilot is referenced here as illustrative of programme-level evidence available from implementing partners; consolidation of such evidence into the digital asset and pilot register proposed in Chapter 13.1 is one route to resolving the verification gap noted above.

However, the MoGEI Curriculum Division review found that only 72 of 361 lessons (20 per cent) were properly sequenced for primary level. Sixty-five per cent were rated low quality, characterized by talk-heavy formats without the interactive elements required by the competency-based curriculum. This means the USB distribution programme is actively distributing content that fails its own quality standard. Continuing distribution without quality assurance is an active risk, not a future concern.

The priority recommendation for Education on Air II is twofold: freeze distribution of unreviewed content pending MoGEI NCDC Technical Review Committee review, and commission 50 new IRI-format lessons in five national languages (Bari, Dinka, Nuer, Zande, Toposa) for P1–P3. The IRI redesign should draw directly on the Somalia Radio model, which demonstrated learning gains attributable to the interactive format and facilitator attendance tracking.

4.1.2 Junub Academy model 1: National e-learning platform (MoGEI / Educare)

Junub Academy is a web-based platform operated by MoGEI in partnership with Educare Organisation. It provides S4 students and teachers with access to curriculum materials, video lessons and revision tools. As of Phase 2, the platform reports 2,000+ verified users, predominantly in Juba and state capitals where connectivity supports web access.

The MTN zero-rating MoU, signed 10 March 2026, means that accessing Junub Academy does not consume data allowances for MTN subscribers. Zain approved zero-rating with implementation confirmed in principle (Zain South Sudan, personal communication, March 2026); operational implementation status should be verified directly with Zain before the Phase 1 MNO operationalization action (Chapter 11.1, Action 3) is marked complete. Digitel has offered server and hosting services (Educare Organisation, 2025). When fully operationalized across all three MNOs, zero-rated access would cover the entire commercial mobile subscriber base, though the addressable population remains limited to smartphone owners with active data subscriptions (approximately 588,000 for MTN alone).

Model 1's primary limitation is its reach ceiling. At 10.5–11 per cent national smartphone penetration and 7.2 per cent electricity access, a web-based platform cannot serve as a primary delivery vehicle for rural or displaced learners. Its role is as a supplementary channel for the urban and peri-urban population that already has device access, and as a teacher resource platform for teachers with smartphones. For the 2.8 million OOSC and the 189,000+ ALP learners, Model 1 is not the answer; Model 2's offline design is.

4.1.3 Junub Academy model 2: Offline classroom pilot (MoGEI / Educare / UNICEF)

The Model 2 offline classroom pilot is the most significant evidence development from Phase 2. Conducted at Warrap Secondary School and Cueibet Secondary School (Lakes State), the pilot enrolled 204 students: 112 experimental and 92 control, across S2 Physics, Mathematics, Chemistry and English. Prerecorded video lessons were delivered via an offline server connected to a projector, with a dedicated facilitator guiding each session.

Results: Warrap recorded pass rate improvement from 22.0 per cent pre-test to 71.0 per cent post-test. Cueibet recorded improvement from 30.3 per cent to 75.5 per cent. These are the only pre-test/post-test digital learning outcome data available from any programme in South Sudan. The pilot explicitly tested equipment reliability: solar power systems, laptops and projectors were operated under Warrap and Lakes field conditions and reliability was described as sufficient for pilot purposes, though device failure rates were not reported numerically.

The results are encouraging but require careful interpretation. The pilot is limited to secondary school (S2), four subjects and two sites. It does not provide evidence of learning gains at primary or ALP level, where the learning crisis is most acute. The facilitation component cannot be disaggregated from the technology component in the current design: the improvement may be attributable to having a dedicated facilitator rather than to the video content itself. A Phase 2 expansion should include a facilitation-only control arm to test this attribution.

The primary risk for Junub Academy's expansion is content quality and curriculum alignment at lower grade levels. The platform currently serves S4 (senior secondary). Extending to ALP and

primary requires three conditions not currently met: curriculum alignment work with MoGEI NCDC, content production in national languages (not currently available on the platform) and facilitator support design for low-literacy contexts where adult literacy is 35 per cent.

4.1.4 ALP digital integration (MoGEI / UNICEF)

The Alternative Learning Programme serves the largest non-school learner population in South Sudan: 189,000+ enrolled, predominantly over-age, displaced and out-of-school learners in community-based settings. UNICEF and MoGEI have initiated digitization of ALP materials for tablet-based delivery, but no confirmed pilot sites have been identified, and no learning outcome data exists from any ALP digital deployment.

This is the most consequential data gap in the entire analysis (Data Gap 4: CRITICAL). Scale-up investment in ALP digital content without a commissioned EGRA/EGMA baseline risks replicating the structural failure that undermined GPEP: reach statistics substituting for learning evidence, followed by scale-up decisions that cannot be evaluated. The ALP population has lower literacy baselines than primary peers, operates in community-based settings without electricity and has no national language digital content available at ALP level.

The recommendation is unequivocal: ALP digital investment must be treated as conditional on a Phase 2 EGRA/EGMA baseline commissioned through MoGEI and OPM before any procurement decisions are taken. This is not a technical recommendation. It is the minimum accountability standard for a programme claiming to serve 189,000 learners with no evidence that the proposed modality works for this population.

4.1.5 IRC AprendIA + vTLC (IRC / Airbel Impact Lab)

IRC's AprendIA platform and virtual Teacher Learning Circles (vTLC) represent the only confirmed AI-enabled education tools operating in South Sudan. AprendIA uses AI-based algorithms to adapt content delivery for CPD, while vTLC operates through WhatsApp to create structured peer learning circles for teachers in IDP and host community settings in Central Equatoria.

Secondary review of IRC programme documentation confirmed that the pilot is in its early operational phase: Android device configuration and system log extraction are ongoing. No published learning outcome data are available yet. IRC applies internal data protection protocols; while the Cybercrime and Computer Misuse Act, 2026 (Republic of South Sudan, 2026) introduces platform liability provisions under Section 42, South Sudan has no dedicated national Data Protection Act, meaning that AI-generated teacher performance data and learner interaction data remain governed by IRC safeguarding frameworks rather than national law. The

The vTLC model is particularly relevant for teacher CPD design. WhatsApp-based learning circles are asynchronous (teachers can participate at their own pace), device-agnostic within the smartphone population and can operate with intermittent connectivity. If combined with zero-rated access, the model could extend CPD reach to the approximately 33.5 per cent of mobile subscribers who own smartphones. The primary limitation is the same as for Junub Academy

Model 1: it cannot reach the 66.5 per cent of subscribers using feature or basic phones. For those teachers, radio-based CPD and SMS remain the only digitally mediated channels.

4.1.6 WPDI satellite community centres (WPDI / Intelsat)

WPDI operates satellite-connected community learning centres using Intelsat VSAT connectivity and the Kolibri offline learning management system. The centres are reported to operate in multiple states, though the exact site count, geographic distribution, per-site connectivity costs and learning outcome data were not confirmed by the KII process (Data Gap 8: UNRESOLVED).

This data gap is the reason satellite community hubs are classified as Tier 3 Conditional in the modality matrix. The cost structure of VSAT connectivity (typically USD 50–150 per site per month in comparable contexts) makes it the most expensive modality per child per year. Without confirmed site data, usage statistics or learning evidence, the cost-effectiveness assessment cannot be completed. No operational data are available in WPDI's published materials to support a cost-effectiveness assessment.

4.1.7 NRC digital learning pilots

The Norwegian Refugee Council operates tablet-based content delivery pilots in Jonglei and Unity, targeting displaced learners. No published learning outcome data are available. The operational significance is that NRC is testing digital delivery in the two states with the highest OOSC rates and the weakest infrastructure, providing real-world viability testing that other programmes have not attempted.

4.1.8 EMIS decentralized digital collection

The MoGEI EMIS Unit is transitioning to electronic data collection for the Annual School Census, using tablets deployed to 2 state statistics officers per state and 1 county senior inspector per county. The 2021 census covered 75 per cent of schools; the 2024 target is 85 per cent; the 2025 target is 90 per cent (EMIS Unit, MoGEI, personal communication, March 2026). Device and electricity indicators have been added to the 2024–25 census tool, which will provide the first school-level digital infrastructure baseline when results are processed.

EMIS's relevance to digital learning is both direct and indirect. Directly, the school-level infrastructure data will inform modality selection decisions at sub-national level. Indirectly, the EMIS tablet deployment is itself a digital system operating under South Sudan's infrastructure constraints, providing operational lessons about device management, battery life, data synchronization and user training that apply to digital learning deployments.

The decisive design question for EMIS is which architecture the transition adopts. DHIS2 (Section 3.5) is the proven precedent: it already runs offline-first data collection across all 80 counties on Android tablets and solar cabinets, and it is the template MoGEI's EMIS 2.0 should follow as it moves from a paper census to electronic tracking. The case is stronger in an education-in-emergencies (EiE) frame. Recurrent displacement and seasonal flooding (Section 2.4) routinely sever connectivity and move learners between schools and settlements; an EMIS

2.0 modelled on DHIS2's offline synchronization and Granular Site Management would keep school-, learner- and attendance-level data flowing through exactly these disruptions, where a connectivity-dependent system would fail. Co-locating EMIS 2.0 data functions with delivery in the County Digital Learning Hub, and co-financing the hardware stack with DHIS2 at county level as the DHIS2 KII team recommended, would give MoGEI its first resilient, emergency-tolerant education data layer rather than a parallel one (EMIS Unit, MoGEI, personal communication, March 2026; World Health Organization & Ministry of Health South Sudan, 2025).

4.1.9 Jesuit Worldwide Learning: Faith-based offline higher learning

Jesuit Worldwide Learning (JWL), in partnership with the Comboni College of Science and Technology, operates the Humanitarian eLearning Platform (HeLP) in Maban and Yambio. The platform delivers accredited higher education, professional certificates and liberal-studies courses to displaced youth and marginalized communities through an offline-first, facilitated model designed for low-bandwidth environments. Its significance for this analysis is threefold. First, it is a rare South Sudanese example of accredited, faith-based digital provision sustained outside the GPE-TESS and UNICEF programme architecture, indicating a partner base wider than the eight programmes catalogued above. Second, its offline-first facilitation design corroborates the report's central finding that learning outcomes track facilitation rather than connectivity. Third, its presence in Maban, a refugee-hosting county, and Yambio extends the evidence base into displacement-affected settings that most digital programmes do not reach. JWL/HeLP should be mapped into the DLCC partner register (Section 7.3) and invited into the common content-standard and EMIS-linked reporting arrangements, both to avoid another parallel system and to draw on its facilitation experience (Jesuit Worldwide Learning, n.d.).

4.2 Content quality: A system constraint

The content quality finding from the MoGEI Curriculum Division KII (Curriculum Division, MoGEI, personal communication, March 2026) reframes how the programme inventory should be read. Of 361 Education on Air audio lessons reviewed, only 72 (20 per cent) were properly sequenced for primary level according to the competency-based curriculum scope and sequence. Sixty-five per cent were rated low quality, characterized by talk-heavy formats that do not include the interactive elements (singing, movement, verbal response pauses, facilitator prompts) required for effective audio-mediated learning at primary level.

This is not a problem that more content production resolves. It is a problem that a content quality assurance process resolves. The MoGEI National Curriculum Development Centre (NCDC) Technical Review Committee is mandated by policy to review educational content before distribution. The committee's mandate exists but the QA checklist has not been operationalized (Data Gap 7: PARTIAL). MoGEI Curriculum Division documentation confirms willingness to co-develop a QA checklist for both audio and digital content, but this work has not been commissioned or funded.

The operational recommendation: the QA checklist must be operationalized within 90 days of DLCC establishment. No further distribution of unreviewed content should proceed. The 72

properly sequenced lessons should be prioritized for redistribution. New content production should follow the IRI format standard demonstrated in comparable contexts (Somalia, Kenya).

The content quality constraint also affects the pupil-textbook ratio. The MoGEI Curriculum Division confirmed an 8:1 pupil-textbook ratio in English and Mathematics nationally (Curriculum Division, MoGEI, personal communication, March 2026). Digital content is positioned as a supplement to printed materials, not a replacement, but if the digital content itself fails quality standards, it compounds rather than addresses the textbook shortage.

Figure 6 presents the programme inventory by modality and evidence status.

Figure 6: Programme Inventory by Modality and Evidence Status. The figure maps all ten digital learning programmes or initiatives against two axes: modality tier (Tier 1 = radio/SD card; Tier 2 = USSD/facilitated offline tablet/blended OER; Tier 3 = VSAT satellite hub) on the horizontal axis, and evidence status (no outcome data / reach data only / pre-post assessment data) on the vertical axis. Education on Air II and ALP Digital Integration sit in the Tier 1/no outcome data quadrant. Junub Academy Model 2 is the sole programme with pre-post assessment data. No programme has published EGRA/EGMA-aligned primary-level learning outcome data.

FIGURE 6: Digital Learning Programme Inventory – South Sudan

Updated with KII Phase 2 data (March 2026). 11 programmes reviewed.

Programme / Platform	Lead Org	Modality	Status	Geographic Reach	Learner Groups	MEL Coverage	Evidence Quality / Alert
MoGEI Radio Broadcasting	MoGEI	Solar Radio Broadcast	ACTIVE	National	Primary / ALP	Weak	Low
Junub Academy Model 1	Junub Academy	Offline Tablet (facilitated)	ACTIVE	Juba + select states	Primary	Moderate	Low
Junub Academy Model 2	Junub Academy	Offline Tablet (facilitated)	ACTIVE	Select states	Secondary (n=204)	Present	/ CONFINED only SS data
UNICEF SD Card & Picture Packs	UNICEF	SD Card + Picture Packs	ACTIVE PILOT	Pilot states	Early Childhood + Primary	Weak	None (SS)
ALP Digital Pilot	MoGEI / Partners	Mixed	ACTIVE PILOT	Limited	ALP (overage)	ABSENT	△ CRITICAL GAP No learning outcome data
MTN Digital Learning (USSD)	MTN SS / MoGEI	USSD / SMS	PLANNED	National (potential)	Youth / ALP	TBD	None (SS)
WPOI Community Centres	WPOI	Satellite VSAT	UNKNOWN	Unknown	Youth / community	ABSENT	△ TOTAL DATA FAILURE All KII unanswered
Save the Children CPO Platform	SCI	App / Web (OER)	ACTIVE	GPE states	Teachers	Moderate	Partial
UNESCO Teacher Training (Radio)	UNESCO	Radio + SMS	ACTIVE	Select counties	Teachers	Moderate	Partial
World Vision Community Radio	World Vision	Radio Broadcast	HISTORICAL	Former coverage	Community	Absent	None
UNHCR Refugee Learning Hubs	UNHCR	Offline Tablet + Radio	ACTIVE	Refugee camps	Refugee children	Present	Partial

ACTIVE PILOT/PLANNED HISTORICAL UNKNOWN

△ = Quality concern / Data failure / Critical gap

Source: KII Synthesis Matrix (Updated, May 2026); Desk Review (31 sources, April 2026) | © UNICEF / MoGEI, May 2026

Figure 6: Digital learning programme inventory, South Sudan (KII Phase 2 data, March 2026). Status: Green = Active; Amber = Pilot/Planned; Grey = Historical; Red = Unknown. Alert icons: content quality concern, data failure, critical measurement gap. Source: KII Synthesis Matrix (Updated, May 2026); Desk Review (31 sources, April 2026).

Programme	Modality	Reach	Status	Outcome data
Education on Air II	Radio + USB	National	Active	None
Junub Academy Model 1	Web platform	National	Live	None
Junub Academy Model 2	Offline class.	2 sites S2	Pilot	Pre/post
ALP Digital Integration	Tablets offline	189,000+ enrol	Pilot	None
IRC ApreDIA + vTLC	AI CPD + chat	Central Eq.	Pilot	None
WPDI satellite hubs	VSAT + Kolibri	Multi-state	Active	None
NRC tablet pilots	Tablets	Jonglei, Unity	Active	None
OLPC solar pilot	Laptops	Few schools	Historic	None
EMIS digital census	Tablets	National 85%	Active	Coverage
DHIS2-TVET-MIS	DHIS2 platform	National	Live 2024	Sector

Ten programmes inventoried. Junub Academy Model 2 is the only initiative with pre/post learning outcome data, and that data is limited to S2 across 204 students at two sites. Reach is tracked across the system; learning outcomes are not.

4.3 Gender disaggregation: A system-wide data gap

No programme in the inventory reports gender-disaggregated enrolment or learning outcome data. The Junub Academy Model 2 pilot (204 students, Warrap and Cueibet) does not report results by gender. The Education on Air II USB distribution does not track female versus male learner reach. The ALP digital integration has no outcome data at all, including no gender breakdown of the 189,000+ enrolled learners.

This is not a peripheral monitoring gap. UNICEF's Gender Action Plan 2022–2025 and the Core Commitments for Girls in Education require gender-disaggregated data as a minimum reporting standard for all UNICEF-supported education programmes. The GPE-TESS Results Framework requires disaggregation by gender as a standard data collection requirement for all programme components. Compliance with both frameworks requires that Phase 2 MEL designs specify gender disaggregation as a non-negotiable data standard at all digital pilot sites not a desirable enhancement, but a baseline compliance requirement.

The practical implication for Phase 2: every Terms of Reference issued for pilot design under GPE-TESS digital learning activities must include an explicit gender disaggregation clause in the data collection methodology. Every EGRA/EGMA assessment tool used in Phase 2 pilots must record and report learner sex as a standard variable. Every facilitator attendance register must record facilitator sex. This data are not available from any current programme in the inventory. Phase 2 must establish what the current landscape has failed to produce.

5. Facilitation and teacher digital capacity

Facilitation quality is not a supporting factor in digital learning outcomes in South Sudan, it is the primary determinant. This finding is not unique to this analysis. The World Bank's Digital Economy for Africa assessment of South Sudan (World Bank, 2022) observed that 'schooling exists, but learning outcomes remain critically low', attributing this to 'acute shortage of qualified teachers, inadequate learning resources, teachers' irregularities due to poor motivation, among others' (World Bank, 2022, p. 57). The Junub Academy Model 2 pilot, the DHIS2 deployment model, the GPEP evaluation, IRC's evidence from Eastern DRC and UNICEF/BBC Media Action's Somalia radio programme all confirms the same pattern: where facilitators are present, trained and consistently supported, learning and data quality improve. Where they are not, hardware sits unused or produces unreliable data.

The Educare Organisation's presentation to UNICEF South Sudan (Educare Organisation, 2025) framed the core problem directly: 'many children are enrolled in schools in South Sudan, but many are not acquiring basic competencies' a finding that aligns precisely with the Montrose International 2016 diagnostic, which recorded 92 per cent of P3 learners unable to sound out a single letter and 45 per cent scoring zero on reading comprehension (Montrose International, 2016). Technology cannot fix this learning deficit without trained humans mediating the content. The budget implication is direct: facilitation infrastructure must be costed before hardware procurement, not after it.

5.1 Teacher workforce profile and digital skills gap

The South Sudanese teaching workforce defines what CPD is and is not feasible at scale. Nationally, 70 per cent of primary teachers have no formal training (UNESCO South Sudan, 2022; Teacher Management Directorate, MoGEI, personal communication, March 2026). Forty per cent are volunteers or part-time staff (UNESCO South Sudan, 2022). The national PTR stands at 93:1 (Ministry of General Education and Instruction [MoGEI], 2023; Teacher Management Directorate, MoGEI, personal communication, March 2026), with significantly higher ratios in Jonglei and Unity where the OOSC crisis is most acute.

The World Bank DE4A assessment mapped South Sudan's teacher digital skills against the EU DigComp 2.1 framework and found that the country's capacity sits at the 'Foundation' level at best, with most teachers lacking even basic information and data literacy competencies (World Bank, 2022, p. 57). The International Computer Driving License (ICDL) programme has been introduced for some teacher cohorts, but the DE4A assessment noted that it remains small-scale, institutionally disconnected and has not been integrated into any formal CPD framework (World Bank, 2022, p. 59).

The 2022 qualitative UNESCO fieldwork confirmed that digital skills are completely absent from the pre-service teacher training curriculum. Where ICT instruction is offered in teacher training institutions, it is theoretical only due to absent computer labs (UNESCO South Sudan, 2022). No population-level quantitative baseline of teacher digital skills has been conducted at any point (Data Gap 9: PARTIAL RESOLUTION proxy indicators available, population baseline absent). The Digital 2026 Report provides the closest available proxy: national adult digital literacy stands significantly below the 34.5 per cent adult literacy rate, and 27.8 per cent of internet non-adopters nationally cite “lack of skills to use the internet” as their primary barrier to connectivity (DataReportal, 2026). Applied to a teaching workforce where 70 per cent lack formal training and 40 per cent are volunteers or part-time staff, these figures establish a credible lower-bound estimate for the digital skills deficit, though they do not constitute a teacher-specific assessment. The Digital 2026 data also note a “Digital Native” dimension: with a national median age of 18.7 years, younger entrants to the teaching workforce are increasingly technology-familiar, creating heterogeneity within the workforce that a single illustrative rating (such as the World Bank DE4A DigComp 2.1 “Foundation” mapping) cannot capture. This partial evidence base does not remove the need for a population level baseline; it sharpens the argument for one. The entire CPD investment strategy for digital learning continues to rest on assumptions about skill distribution that proxy data can bound but not resolve.

Salary delays are the single greatest driver of teacher absenteeism, a structural constraint confirmed across multiple KII sources (Teacher Management Directorate, MoGEI, personal communication, March 2026; Save the Children International respondent, personal communication, March 2026; UNESCO respondent, personal communication, March 2026). The Educare presentation (Educare Organisation, 2025) listed ‘teachers’ irregularities due to poor motivation’ as a primary cause of the learning crisis, a finding independently confirmed by GPEP endline data (Cambridge Education, 2018) and by the GESP 2023–2027, which sets a target of reducing untrained teacher proportions from 70 per cent to 50 per cent by 2027 a target that has no confirmed funding source.

Gender note: No KII yielded gender-disaggregated data on teacher digital skills or CPD participation rates. The World Bank DE4A assessment documents a consistent gender gap in digital access and use across South Sudan’s workforce (World Bank, 2022), which would affect female teacher participation in smartphone-dependent CPD channels (Channels 5 and 6) disproportionately. The teacher digital skills baseline commissioned in Phase 1 should disaggregate results by gender as a standard requirement of the assessment TOR.

5.2 Six functioning CPD channels: Detailed analysis

Six CPD channels are currently functioning in South Sudan. The key insight from the KII cross-analysis is that no single channel can serve the entire teacher workforce given the infrastructure and workforce constraints. A blended architecture combining channels based on connectivity and capacity profiles is the only viable approach.

Channel 1: Cluster Meetings and School-Based Training. This is the primary existing channel for cascaded curriculum training. County Education Centre (CEC) tutors train teachers in school clusters. The channel requires no electricity, no digital devices and no connectivity. It is face-to-face, language-flexible and institutionally embedded in the GESP 2023–2027 framework. Its limitation is well-documented: quality dilutes at each cascade level. The GESP plans to train 7 tutors per county (560 total) for school-based mentoring, but this staffing target has not been costed against the Phase 2 budget. The critical question for Phase 2 is whether these 560 tutors can also serve as digital learning facilitators if equipped with tablets and observation checklists, effectively merging the CPD and digital learning supervision functions.

Channel 2: County Education Centres (CECs). 59 CECs are being rehabilitated as institutional hubs for formal face-to-face in-service training. These are the primary physical infrastructure for CPD delivery and the logical anchor points for the County Digital Learning Hub model proposed in Chapter 11. If equipped with solar power and Android tablets as part of the DHIS2 co-financing model, CECs could serve simultaneously as CPD delivery points, digital content distribution nodes and EMIS data collection centres. The co-location argument is efficiency: one solar installation, one set of Android tablets and one trained operator can serve DHIS2 health data, EMIS education data and CPD delivery from the same physical hub.

Channel 3: Radio (Education on Air). Radio reaches teachers as well as students. Broadcast content models instructional practices: when a radio lesson demonstrates interactive questioning, pausing for student response and using singing to reinforce vocabulary, the teacher listening alongside students receives a live demonstration of the competency-based pedagogy that short workshops struggle to instil. The IRI format upgrade recommended for student content in Chapter 4 would simultaneously improve radio's value as a CPD modelling channel. In Somalia, UNICEF/BBC Media Action found that facilitator attendance during IRI broadcasts was the single strongest predictor of learning engagement (UNICEF & BBC Media Action, 2020). The same principle applies in South Sudan: radio CPD works when someone is listening alongside students and acting on what they hear.

Channel 4: SMS/MNO Campaigns. MTN's Back-to-Learning campaign reached 4.5 million people via SMS (MTN South Sudan, personal communication, March 2026). IoGT reached 150,000 children and youth through UNICEF's partnership with MTN (MTN South Sudan, personal communication, March 2026). SMS is a broad outreach channel, not a depth CPD channel. Its value is in signposting: directing teachers to available resources. It operates on the 2G footprint and reaches the 66.5 per cent of MTN subscribers using feature phones who cannot access app-based platforms. For CPD specifically, SMS can deliver micro-learning prompts (e.g., 'this week's P2 maths lesson: ask students to count objects in pairs'), schedule reminders for cluster meetings and distribute assessment results.

Channel 5: Junub Academy Teacher Resources (Zero-Rated). Since the MTN-MoGEI-Educare MoU was signed on 10 March 2026, zero-rated access to curriculum materials and teacher education resources has been available via the Junub Academy platform. The Educare Organisation describes the platform as 'mobile-first designed, zero rated for free internet, offline capable, optimized for limited bandwidth' (Educare Organisation, 2025). Urban and peri-urban teachers are the primary users. The channel is limited to smartphone owners with active data

subscriptions: approximately 588,000 MTN subscribers nationally (MTN South Sudan, personal communication, March 2026). Zain approval for zero-rating is confirmed in principle (Zain South Sudan, personal communication, March 2026); operational implementation status should be verified directly with Zain before the Phase 1 MNO operationalization action (Chapter 11.1, Action 3) is marked complete.

Channel 6: IRC vTLC + WhatsApp Chatbot. Virtual Teacher Learning Circles using WhatsApp and AI-powered chatbot support for IDP/host community teachers in Central Equatoria. This is the only confirmed AI-enabled CPD model in South Sudan (International Rescue Committee [IRC], 2023). The channel is smartphone-dependent but operates asynchronously: teachers can participate at their own pace, view responses when connectivity allows and engage in peer discussion through structured group protocols. Android device configuration and system log extraction are ongoing; no published outcome data are available yet. IRC applies internal data protection protocols because South Sudan has no national Data Protection Act. If results from the Central Equatoria pilot demonstrate CPD effectiveness, the model could extend to other states with sufficient smartphone penetration and IRC operational presence.

5.3 Master trainer model: Evidence against standalone deployment

Evidence from three sources converges on a single assessment. MoGEI Teacher Management (Teacher Management Directorate, MoGEI, personal communication, March 2026): the master trainer cascade model is ‘not currently feasible at scale as a standalone strategy’. Save the Children GPE-TESS documentation: quality dilutes at each cascade level, and government officials selected as trainers often lack the experience to deliver participatory instruction. UNESCO Education Sector Review: English-medium training excludes a significant proportion of participants, and short workshops (2–5 days) cannot address the pedagogical foundation gap for 70 per cent of teachers who lack basic training.

The GESP 2023–2027 relies on the cascade approach as its primary CPD delivery strategy (MoGEI, 2023, Section 4.2). This creates a documented tension between policy aspiration and operational reality one of the six contradictions recorded in the KII Synthesis Matrix Contradiction Register (Sheet 4). The report’s position: do not abandon cascade structures but combine them with mandatory digital reinforcement. The decentralized mentoring model (7 tutors per county, school-based visits) paired with zero-rated Junub Academy teacher resources and the IRC vTLC model for IDP-adjacent contexts represents the most viable CPD architecture for the current workforce.

The Educare Organisation’s Junub Academy Model 2 pilot in Warrap and Lakes provides indirect evidence on this point. The 22 per cent→71 per cent and 30.3 per cent→75.5 per cent pass rate improvements were achieved with a dedicated facilitator present for every session (Educare Organisation & MoGEI, personal communication, March 2026). The facilitator was not a certified teacher but a trained operator who guided the session, managed the equipment and ensured students completed response activities. This confirms the DRC and Somalia evidence: the human mediating the technology matters more than the technology itself.

5.4 DHIS2 granular site management as CPD template

The Granular Site Management (GSM) model used in DHIS2's HIV programme pilots is the most directly applicable supervision template for digital learning CPD. The DHIS2 Technical Framework and MoH National Performance Report (World Health Organization & Ministry of Health South Sudan [WHO & MoH], 2025) document four operational features: field officers stationed at facility level conducting daily data collection; weekly dashboards for onsite performance reviews; pictorial job aids designed for low-literacy health workers (World Bank, 2022); and continuous onsite mentoring rather than one-off workshops.

The GSM model reversed the traditional approach to supervision. Rather than supervisors visiting to inspect and report compliance failures, GSM coaches visit to model correct procedures, observe practice and provide immediate feedback. The DHIS2 team reported that this shift from compliance-monitoring to coaching-supervision was the primary driver of improvement in data quality at facility level. The HIS maturity score of 40.5 per cent (WHO assessment, classified as 'Minimal') is modest by global standards, but the trajectory from zero to 1,162 reporting facilities across 80 counties demonstrates that the model works under South Sudan's conditions.

Applied to education CPD: county-level education officers equipped with Android tablets and standardized lesson observation checklists, conducting monthly school visits and feeding results into a dashboard visible to state-level supervisors. This design is operationally achievable within the existing CEC infrastructure. The CEC digital CPD programme proposed for Phase 2 pilots this model in three states, explicitly drawing on the DHIS2 hardware stack (Android tablets at USD 80–120, solar charging cabinets at USD 200–400, power banks at USD 15–25) and the GSM supervision logic.

5.5 Device subsidy and teacher access

The Educare Organisation has proposed a 'Parent for Child Device (PCD) Campaign' to address the device access gap for learners and teachers (Educare Organisation, 2025). The campaign envisions partnerships with manufacturers for bulk purchase of e-learning devices, government tax exemption to subsidize prices and MTN's Bera-Bera mobile money platform for instalment payments. A parent, Denial Chiec Gak, is quoted in the Educare presentation stating that parents would support children with devices if supplementary learning programmes existed, given that school fees are now covered by the government.

The PCD concept is directionally sound but must be assessed against affordability data. A 20 per cent import tax and 25 per cent NBS type-approval fee add an estimated 45 per cent to the landed cost of devices (MTN South Sudan, personal communication, March 2026). The World Bank DE4A assessment found that only 7 per cent of South Sudan's population lives within 50km of a fibre node and only 4 per cent within 10km (World Bank, 2022), meaning that device subsidies without accompanying connectivity are of limited value outside Juba. For teachers specifically, institutional device provision through the CEC hub model is more reliable than individual subsidy schemes, because it concentrates devices at points where supervision, charging and content updates can be managed.

6. Learner profiles and structural exclusion

The five profiles below establish which learner groups are structurally excluded before a device is ever switched on. They inform the equity logic in Chapter 9's Six Principles: each principle is partly a direct answer to the constraints these profiles document.

Equity in South Sudan's digital learning context is a question of which learner groups are structurally excluded before a device is ever switched on. The World Bank DE4A assessment documented a stark gender gap across key indicators (World Bank, 2022), reinforcing that digital strategies which do not account for pre-existing exclusion patterns will replicate and amplify those patterns. The five profiles below cover the majority of South Sudan's unreached school-age population.

Table 1: Structural Exclusion by Modality a matrix mapping each learner profile against viable modalities is included in the Data Package and should be inserted here on final formatting.

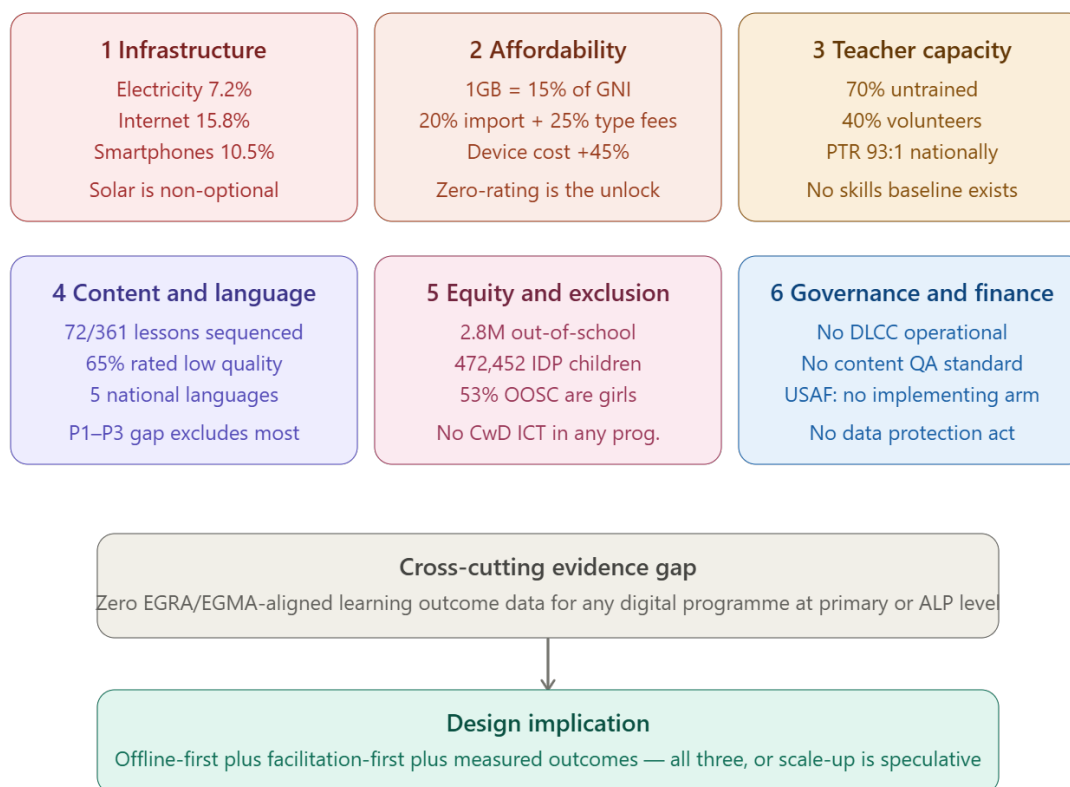
FIGURE 7: Equity & Inclusion Access Matrix — Learner Group × Digital Learning Modality

South Sudan — RAG rating based on infrastructure, device ownership, connectivity, and registration requirements

	Radio Broadcast	SD Card + Picture Packs	USSD / SMS	Offline Tablet (Facilitated)	App / Web Platform	23% gender gap in mobile ownership → device-requiring modalities structurally disadvantage girls (GSMA Sub-Saharan Africa composite, 2024)
Girls — rural & IDP	GREEN Household delivery	GREEN No device required	AMBER 23% mobile gender gap	AMBER Centre access barrier	RED Device + data required	AMBER Centre access barrier
Remote rural communities	GREEN Broadcast reach	GREEN Via faith-based NGO	AMBER 2G coverage required	RED No centre in reach	RED No connectivity	RED Cost and distance
Nomadic / pastoralist	GREEN Portable radio	GREEN Via markets/ health	AMBER Seasonal movement	RED Fixed centre required	RED No device/data	RED No fixed site
IDP children	GREEN Portable, no registration	GREEN No registration required	AMBER Fixed SIM required	AMBER Site stability varies	RED Registration risk	AMBER If site in IDP area
Out-of-school (non-ALP)	GREEN Passive learning	GREEN Via community entry	AMBER Outreach required	RED Requires enrolment	RED Device/data barrier	AMBER If within reach
Children with disabilities	AMBER Audio-only content	AMBER Large icon interfaces needed	RED Text-only, no audio	AMBER Assistive tech absent	AMBER If accessible design	AMBER Assistive tech absent
GREEN — Reachable AMBER — Conditional RED — Structurally Excluded Source: Desk Review §5; GSMA (2024); UNHCR (2024); MICS (2025, forthcoming) © UNICEF / MoGEI, May 2026 △. Disability ratings assume no assistive technology available (confirmed across all KIs)						

Figure 7: Equity and inclusion access matrix by learner group and digital learning modality, South Sudan. Red, amber, green (RAG) rating based on infrastructure, device ownership, connectivity and registration requirements. Gender gap proxy: GSMA Sub-Saharan Africa composite (2024). Source: Desk Review §5; GSMA (2024); UNHCR (2024); MICS (2025, forthcoming).

Six clusters that define what is and is not feasible



6.1 Profile 1: Girls in remote rural schools

A female teacher in Unity State describes her cluster meeting schedule collapsing every July when the roads flood. She has not received curriculum materials since 2023. The girls in her P3 class roughly half of whom stopped attending last term due to household labour demands during the harvest period have no access to radio at home. The nearest functioning school with any electricity is 40 kilometres away. When asked what would help her reach the girls who had dropped out, she said: someone to come to the village, not a phone number to call. (Composite scenario drawn from Save the Children GPE-TESS programme documentation and UNESCO Education Sector Review, 2022.)

Approximately 53 per cent of 2.8 million OOSC are girls (MoGEI & UNICEF, 2021). In Unity and Jonglei, total OOSC rates exceed 80 per cent (MoGEI, 2023) and girls' exclusion rates are higher than boys' across all states with disaggregated data. The barriers are structural: distance from school, household labour demands, safety concerns on long routes and near-total absence of female teachers in rural postings. The World Bank DE4A assessment highlighted the GoGirls Initiative (World Bank, 2022, p. 61) as one of the few programmes targeting the gender digital divide, though it operates primarily through coding and technology camps in Juba rather than through the radio/offline channels that reach rural girls.

Viable modalities for reaching girls in remote rural settings are limited to those that do not require travel to fixed locations or personal device ownership: radio with female-modelled content and community listening groups; take-home printed packs with audio guides; facilitated sessions at community level rather than school-fixed locations. USSD requires a SIM-enabled device, which is inaccessible to most rural girls. Facilitated tablet centres are location-fixed and require travel. Web platforms require smartphone access that is below 8 per cent in rural areas (estimated from MTN KII device split applied to rural population distribution).

The minimum standard: gender-disaggregated content, female facilitator incentives in community listening groups and content production in five national languages (Bari, Dinka, Nuer, Zande, Toposa) covering P1–P3. The Educare Organisation's four delivery models (Open Access/Telecom, Offline Classroom, School Digital Library, Live Virtual Class) are primarily designed for school-based or connectivity-dependent delivery (Educare Organisation, 2025). None explicitly addresses community-based delivery for out-of-school girls in rural settings. This gap in the current programme inventory must be addressed in Phase 2 design.

6.2 Profile 2: Internally displaced children

An IRC field facilitator working in a displacement site in Jonglei describes distributing USB sticks with audio lessons to families in October 2024. By December, roughly a third of the families she had registered had moved again some to Upper Nile, some back towards their home counties as the floods receded. The USB sticks went with them, but the facilitator who knew how to use them did not. At the next distribution point, new families arrived who had never seen the material and had no one to guide them through it. (Composite scenario. Sources: IRC ApreDIA and vTLC Programme Documentation; UNHCR South Sudan IDP Data, 2024.)

472,452 children are internally displaced as of UNHCR 2024, concentrated in Jonglei, Unity, Warrap and Upper Nile. The figure may undercount current displacement given 2024–2025 conflict and flooding dynamics. South Sudan's road density is the lowest in Africa at 15 km per 1,000 square km of arable land (World Bank, 2022, p. 34), making physical distribution of learning materials to IDP populations logistically difficult, especially during the July–October flood season when road networks become impassable.

Viable modalities: radio (no address requirement), USB sticks (take-home), IRC vTLC model for facilitators serving IDP sites and take-home learning packs that travel with families. Location-fixed modalities (tablet centres, VSAT hubs) are structurally excluded for IDPs. IRC applies internal data protection protocols in the absence of a dedicated national Data Protection Act (International Rescue Committee [IRC], 2023). The Cybercrime and Computer Misuse Act, 2026 introduces platform liability under Section 42 and cyber harassment provisions under Section 67, but does not establish a data protection framework governing learner data, consent or cross-border data transfers. The World Bank DE4A assessment recommended establishing 'regulatory frameworks that encourage data sharing for public benefit while safeguarding individual rights' (World Bank, 2022) a recommendation that remains unimplemented and is a prerequisite for any learning analytics or adaptive platform deployed to IDP populations.

6.3 Profile 3: ALP learners

A community-based ALP centre in Warrap operates under a tree, with a volunteer facilitator who has no formal training and receives no salary. Seventeen learners attend when they can ages ranging from 12 to 23. Three have never held a tablet. None of the curriculum materials available at the centre are in Dinka. When the MoGEI ALP unit was asked in the March 2026 KII what digital learning outcome data existed for learners like these, the answer was unambiguous: none. Not low-quality data. No data. (ALP Unit, Ministry of General Education and Instruction [MoGEI], personal communication, March 2026; Save the Children International respondent, personal communication, March 2026)

189,000+ enrolled in the Alternative Learning Programme (MoGEI & UNICEF, 2021; ALP Unit, MoGEI, personal communication, March 2026). The GESP 2023–2027 sets an Alternative Education System (AES) enrolment density target of 2,000 per 100,000 inhabitants by 2027, up from 683 in 2021 (MoGEI, 2023, Table 4.3). ALP learners are predominantly over-age with lower literacy baselines than primary peers, situated in community-based settings without electricity. No national language digital content at ALP level currently exists. The Educare Organisation's Junub Academy platform includes ALP-relevant technical and vocational education and training (TVET) content in its longer-term vision (Educare Organisation, 2025), but no ALP-specific content at primary equivalent level has been produced.

This is the most consequential data gap in the entire analysis (Data Gap 4: CRITICAL). Zero learning outcome data from any ALP digital pilot site. Scale-up investment must not proceed without an EGRA/EGMA baseline commissioned through MoGEI and OPM before any ALP digital procurement is approved. The GPEP experience provides a cautionary precedent: USAID invested USD 30.1 million (RTI International & OPM-Cynosure, 2017) in a programme whose endline revealed that inflated baselines from teacher-selected student samples had masked the absence of genuine learning gains (Cambridge Education, 2018).

6.4 Profile 4: Children with disabilities

A disability-inclusive school in Juba one of three in the country serves 47 children with hearing and visual impairments. The school has received four tablets from a recent NGO distribution. None of the tablets have been assessed for screen reader compatibility. The content loaded on them is in English, which the children's signing facilitator has limited literacy in. When asked whether any digital learning content had been adapted for the children's needs, the response from the school administrator was direct: "We have not seen anything like that." The National Inclusive Education Policy (2020) mandates adaptive and assistive ICT. No programme in the current inventory has tested for screen reader compatibility or produced content in South Sudan Sign Language. The GPE target of 3,000 children with disabilities served has no baseline denominator to measure against. (Composite scenario. Sources: KII cross-analysis, all 14 evidence pathways; Save the Children GPE-TESS Programme Document 2024–2028; National Inclusive Education Policy, 2020; MoGEI EMIS Key Informant Interview (KII), March 2026.)

Across all fourteen evidence pathways reviewed for this analysis, not one source could identify a South Sudanese digital learning platform that had been tested for screen reader compatibility or adapted for learners with visual or hearing impairment. The National Inclusive Education Policy (2020) mandates adaptive ICT. No programme has operationalized it. In the absence of a national CwD population

baseline, programme documents set targets the GPE target of 3,000 CwD without a denominator to measure against. The child with a disability in a remote school is, in the current digital learning ecosystem, entirely unaddressed. (Composite scenario. Sources: KII cross-analysis, all 14 evidence pathways; Save the Children GPE-TESS Programme Document 2024–2028; National Inclusive Education Policy, 2020.)

No national estimate of the CwD population in the school-age cohort exists. The GPE target of 3,000 CwD (Save the Children International, 2024) has no verified baseline denominator. The National Inclusive Education Policy (2020) mandates adaptive and assistive ICT, but no current programme includes CwD-specific adaptive design (confirmed across all seven primary KIIs and all seven secondary desk reviews). The World Bank DE4A assessment did not address CwD digital access in its education section, a gap that mirrors the absence of this dimension from every programme design document reviewed.

EMIS 2.0 will track disability status at school level when operational (EMIS Unit, MoGEI, personal communication, March 2026). Until this data are available, CwD-inclusive design must be specified as mandatory in all new TFL procurements. USSD and text-based platforms structurally exclude children with visual impairment. No screen reader compatibility has been tested for any South Sudanese digital learning platform, including Junub Academy.

6.5 Profile 5: Nomadic and pastoralist children

A Mundari pastoralist family moves their cattle across three counties between June and October following the seasonal grazing circuit. Their eldest child, aged 11, enrolled in a primary school in Lakes State in January. By April she had left with the family. She will return in November if the rains do not delay the circuit. EMIS does not track her. There is no digital platform in South Sudan that requires neither registration, a fixed address, nor continuous connectivity and still functions when she is three days' walk from the nearest 2G tower. The only technology that could reach her in the dry season is a battery-powered radio and an SD card in a waterproof case. Any investment plan that does not include these modalities as primary reach vehicles for the nomadic population has made a deliberate design decision to exclude her. (Composite scenario. Sources: General Education Strategic Plan (GESP) 2023–2027; World Bank DE4A, 2022; MoGEI EMIS 2021; DataReportal Digital 2026: South Sudan.)

Pastoralist families in Lakes and Jonglei move with their cattle across seasonal grazing circuits that take them outside mobile coverage, across state lines and away from any fixed school for months at a time. EMIS does not track them. No digital platform requires registration or a fixed address and still functions without connectivity. The only modalities that travel with these children are the ones that fit in a pocket: an SD card, a printed picture guide, a battery-powered radio. Any digital learning investment that does not include these modalities in its primary reach plan has made a design decision to exclude this population. (Composite scenario. Sources: GESP 2023–2027; World Bank DE4A, 2022; MoGEI EMIS 2021.)*

Not disaggregated in EMIS. Concentrated in Lakes, Jonglei, Warrap and Western Bahr el Ghazal. Highly mobile, no fixed school, seasonal displacement. The GESP 2023–2027 acknowledges pastoralist education as a strategic priority but does not specify digital modalities

for this population. No platform requiring registration or fixed-address tracking is viable. Take-home SD cards that travel with families, community radio reception and printed picture guides are the only modalities with structural reach.

6.6 Structural exclusion summary

Radio and SD card are the only two modalities with structural reach across all five profiles, subject to one condition: content must exist in national languages. The absence of P1–P3 digital content in Bari, Dinka, Nuer, Zande and Toposa is an equity gap. The Educare presentation notes that ‘without zero-rating of the National e-learning Platform, digital education remains inaccessible to the poorest households’ (Educare Organisation, 2025). This is correct for online modalities. For the five profiles above, the barrier is more fundamental: even free online access does not reach populations without devices, electricity or fixed locations. Offline-first, take-home and broadcast modalities are the equity floor.

6.7 Inclusive digital learning: Disability-responsive design and gender equity in device access

Digital learning design in South Sudan cannot treat inclusion as an afterthought. Section 6.4 documents that children with disabilities represent an estimated 4–5 per cent of the school-age population between 190,000 and 237,500 children with an OOSC rate significantly higher than the national average of 59 per cent. No current digital programme in South Sudan reports enrolment data for learners with disabilities, and no content has been adapted for disability-responsive delivery. This absence is not passive: it is an active choice to design programmes that systematically exclude an already-excluded population, in direct contravention of SDG 4.5 (eliminating disparities for children in vulnerable situations), SDG 4.a (disability-sensitive learning environments) and the Cybercrime and Computer Misuse Act 2026's implicit child safety obligations.

Disability-responsive design for offline-first digital learning in low-resource contexts does not require expensive assistive technology. It requires design decisions made at content production stage. The following adaptations are achievable within existing content development budgets and are recommended as mandatory standards for all content approved by the DLCC QA checklist:

Audio-first content design: All digital content packages should include an audio-primary version in which all written instructions, questions and explanations are narrated. This serves learners with visual impairments, learners with low print literacy (including the 92 per cent of P3 learners who cannot decode a single letter) and teachers who are Arabic or Dinka first-language speakers. The IRI (Interactive Radio Instruction) format recommended for Education on Air II in Section 4.1.1 already incorporates audio-primary design; extending it to tablet-based content costs no additional production budget beyond a voice-over recording session.

Simplified user interface (UI) design: RACHEL and Kolibri both support accessibility themes. Kolibri specifically offers a simplified UI mode reducing cognitive load for learners with intellectual disabilities or limited prior device exposure. Font sizes should be set at a minimum of

18pt for all learner-facing content. Navigation should use pictorial icons rather than text labels, consistent with the DHIS2 pictorial job aid design principle already proven in South Sudan's 80-county deployment.

Captioning and sign language inserts: For learners with hearing impairments, video content should incorporate South Sudanese Sign Language (SSSL) inserts for key instructional segments. SSSL capacity exists through partners including Across South Sudan and the South Sudan Red Cross deaf school programme in Juba. Adding SSSL inserts at the video production stage adds minimal cost compared to retrofitting captions after production.

Flexible pace and repeat functionality: Offline servers inherently support learner-controlled pacing: learners can replay video segments, pause for physical activity and return to content without time pressure. Facilitators should be trained to enable this explicitly rather than treating the offline classroom as a broadcast model with a fixed pace.

Gender equity in device access is the second dimension of the Leave No One Behind (LNOB) commitment. The structural barriers to girls' digital access in South Sudan are documented throughout this report: 53 per cent of 2.8 million OOSC are girls (Section 6.1); rural girls face distance, household labour and safety barriers that prevent travel to fixed digital learning locations; and the World Bank DE4A assessment (2022) documents a consistent gender gap across all digital access and use indicators. Any device access model that relies on individual ownership, travel to a fixed centre or unaccompanied access to shared facilities will replicate and deepen that gap.

The following design requirements apply across all Phase 2 digital learning pilots and should be stated as binding conditions in all Terms of Reference and sub-grant agreements:

Female facilitator parity: Each digital learning site must have at least one female facilitator trained and operational. Female facilitator presence is the single most significant predictor of girls' enrolment and sustained participation in community-based learning programmes across comparable EiE contexts (IRC, 2023; UNHCR, 2024). **The Phase 2 facilitator training plan must specify gender targets and report against them.**

Take-home content for girls who cannot attend: Pre-loaded SD cards or printed audio-guide packs should be available for take-home distribution to girls who cannot attend centre-based sessions due to household responsibilities or distance. This requires content cleared through the DLCC QA process to be packaged in a format that does not require a facilitator present, with simple pictorial instructions for use.

Session timing flexibility: Programme schedules must accommodate girls' household labour patterns. Sessions offered only in the morning (when many girls are responsible for water collection and younger siblings) will systematically exclude them. Offering sessions in at least two time slots morning and late afternoon increases girls' participation rates in comparable contexts by 20-35 per cent (Save the Children International, 2024).

Community listening groups with female leadership: For radio and audio content, community listening groups modelled on the Somalia IRI format (UNICEF & BBC Media Action, 2020) should designate a female group leader responsible for attendance tracking and follow-up with

girls who miss sessions. This model has been piloted in Upper Nile and Lakes States through Save the Children's EiE programming and is transferable to the digital learning context.

Gender-disaggregated outcome data are the accountability mechanism for all the above commitments. As noted in Section 4.3, no current programme in South Sudan reports gender-disaggregated digital learning enrolment or outcome data. Every EGRA/EGMA assessment administered under Phase 2 must record and report learner sex as a standard variable. The DLCC should establish a gender equity dashboard reporting quarterly against enrolment parity and learning outcome gaps. Without this data, the LNOB commitment remains aspirational rather than operational. (Inter-Agency Network for Education in Emergencies (INEE) Minimum Standards for Education, 2024 Edition; SDG 4.5; UNICEF Gender Action Plan 2022-2025; IRC, Inclusive Education in Emergencies Technical Brief, 2023.)

7. Governance, policy and financing

South Sudan has a substantial policy framework for digital learning and a critical gap between that framework and operational practice. The World Bank DE4A assessment identified this same pattern across the entire digital economy: 'institutional governance is in place, with the Ministry of ICT and Postal Services (MICT&PS) and the National Communications Authority (NCA) spearheading the ICT Agenda' (World Bank, 2022, p. 25), but implementation mechanisms lag far behind the policy architecture.

7.1 Policy framework: Six documents and one conference

Seven policy instruments now frame the mandate for digital learning in South Sudan. The National General Education Policy (2017–2027, Section 12) mandates ICT literacy for all teachers by 2030 and e-learning curriculum integration. The GESP 2023–2027 prioritizes equity, resilience and innovation, including an e-learning platform for TVET and digitalized inspection systems. The National Inclusive Education Policy (2020) mandates adaptive and assistive ICT for learners with disabilities. MoICT's ICT Sector Policy (Section 6.3.8) assigns responsibility for the national e-learning framework to MoICT. The National Communication Act (2012) establishes USAF. The AU Digital Education Strategy 2023–2028 provides eight building blocks South Sudan has endorsed, including an explicit policy recommendation for the "creation of specific offline functionalities" for e-learning platforms to enhance access for those living in disconnected remote areas, incorporation of ICT training into both pre-service and in-service teacher training and an "Africa School and Campus Network" initiative to build shared digital infrastructure as a cross-cutting element (African Union, 2022).

An eighth instrument completes the policy framework: UNICEF's Core Commitments for Children in Humanitarian Action (CCCs). South Sudan operates under a Level 3 humanitarian response designation. The CCCs establish minimum operational standards for all UNICEF programming in such contexts, including education. For digital learning specifically, the CCCs require that Technology-Facilitated Learning initiatives meet the INEE Minimum Standards for Education in Emergencies specifically Domain 4 (Teaching and Learning), which requires that learning approaches account for disrupted schooling cycles, population displacement and the

absence of qualified teachers. All Phase 2 pilot designs under GPE-TESS must be assessed against these minimum standards before procurement. The DLCC should adopt INEE Minimum Standards compliance as a standing procurement checklist item from its inaugural meeting.

The Cybercrime and Computer Misuse Act, 2026, signed by President Salva Kiir on 18 February 2026. This Act introduces three provisions with direct implications for digital learning programme design. Section 42 (Platform Liability) holds platform administrators, including social

The 2024 ICT for Education Conference (10–11 September 2024) produced a communique signed by 26 Ministers and witnessed by the Vice President. The Educare Organisation's presentation to UNICEF (Educare Organisation, 2025) summarized the conference's significance: it confirmed that 'traditional classroom alone is not enough to confront educational challenges at hand' and issued a 'call to integrate e-learning into the telecom service, mobilize resources, leverage telecom networks for scalability' (Educare Organisation, 2025). This communique provides NCA with the regulatory legitimacy to formalize zero-rating as a public benefit arrangement. The Republican Order RSS/RO/J/04/2023 directing implementation of fee-free compulsory education further supports extending free education to the digital space.

A parallel cluster of national digital-transformation instruments, led by the Ministry of Information, Communication Technology and Postal Services (MICT&PS, or MoICT), frames the wider environment within which digital learning operates and with which the DLCC (Section 7.3) must align. These include the National Communication Act (2012), which establishes the NCA and the USAF; the MoICT ICT Sector Policy, which assigns the national e-learning framework to MoICT (Section 6.3.8) and anchors spectrum and infrastructure regulation; the National Broadband Roadmap and the Digital Government Strategy, which set connectivity and e-services targets; and the Cybercrime and Computer Misuse Act (2026), which governs platform liability and child online safety. MoICT's formal mandate spans ICT policy, spectrum regulation and national digital infrastructure, and it co-leads South Sudan's participation in the regional digital-integration agenda. The practical implication is that digital learning is not governed by education policy alone: MoGEI holds the pedagogical mandate, but MoICT controls the regulatory and infrastructure instruments on which delivery depends. Mapping these mandates explicitly is a precondition for the coordination architecture set out in Section 7.3 (World Bank, 2022; ICT Policy Directorate, MoICT, personal communication, March 2026; DataReportal, 2026).

7.2 Policy-practice gap by GESP objective

The gap between policy commitment and operational reality is widest in three areas, each tied to a specific GESP 2023–2027 objective.

First, ICT literacy for all teachers by 2030 (National General Education Policy, Section 12): no baseline data exists, no competency framework is operational, and no budget line is confirmed. The GESP 2023–2027 lists the baseline for 'proportion of teachers practicing effective teaching practices' as TBD. The World Bank DE4A mapped South Sudan's digital skills against DigComp 2.1 and found capacity at the 'Foundation' level (World Bank, 2022, p. 57), but this mapping was illustrative, not based on a quantitative teacher assessment. UNESCO Education Sector Review

documentation confirms institutional willingness and capacity to co-lead a baseline (estimated USD 40,000–70,000).

Second, content quality assurance (MoGEI NCDC Technical Review Committee mandate): the committee is mandated but not operational. This is the direct cause of 65 per cent of 361 radio lessons being rated low quality and distributed on 3,000+ USB sticks without review (Curriculum Division, MoGEI, personal communication, March 2026). The pupil-textbook ratio stands at 8:1 in English and Mathematics (Curriculum Division, MoGEI, personal communication, March 2026). Digital content is positioned as a supplement to printed materials, but if the digital content fails its own quality standards, it compounds rather than addresses the textbook gap.

Third, USAF implementation. The fund collects 2 per cent of MNO annual revenue (National Communication Authority [NCA], 2021; ICT Policy Directorate, MoICT, personal communication, March 2026). USD 9 million was approved in June 2025 for fibre backbone design. Education is an eligible category. But the USAF has no implementation agency: it collects revenue, publishes performance reports and cannot execute projects. The World Bank DE4A assessment recommended a multi-stakeholder approach to fibre deployment, noting that 'given fiscal constraints, a multi-stakeholder approach will be needed to finance the deployments, including leveraging capital from the private sector' (World Bank, 2022, p. 33). Without an institutional mechanism, the USD 9M remains undeployable for education.

7.3 DLCC design and sustainability rationale

The DLCC is designed as a MoGEI task force, not a GPE programme committee. This distinction is the difference between a governance structure that dissolves when GPE-TESS funding ends in 2028 and one that persists within the ministry's institutional architecture. The DLCC reports to MoGEI senior management (Undersecretary level or above), is co-chaired by MoGEI ICT Unit and MoICT ICT Policy Directorate and includes NCA as a regulatory observer.

The case for the DLCC is sharpened by what happens without it. The programme inventory in Chapter 4 already describes a fragmented system: eight digital learning programmes operating on separate platforms (Junub Academy, AprendIA, Kolibri-based deployments, WPDI satellite centres), with distinct training approaches, incompatible data systems and geographically scattered pilots that do not share content standards, learner records or evaluation frameworks. In a fragile context where partners default to self-contained delivery models, the realistic counterfactual to the DLCC is not coordination by goodwill but the continued accumulation of parallel systems, each with its own procurement chain, facilitator cadre and reporting line, none of which transfers to MoGEI when the funding cycle ends. The cost of this fragmentation is paid three times: in duplicated infrastructure, in teachers asked to learn multiple platforms and, in a ministry, unable to compare results across programmes it nominally oversees. Partner alignment under the DLCC should therefore be treated as a condition of new digital learning investment, not an aspiration: donors and implementing partners routing new programmes through DLCC review, adopting the common content quality standard and committing to EMIS-linked reporting are the minimum tests of whether coordination is real.

Stakeholder validation (June 2026) sharpened one design caution: the DLCC should interface with, not duplicate, the coordination architecture MoICT already operates. MoICT convenes an existing digital-transformation coordination mechanism and carries a heavy reform mandate spanning connectivity, e-government and spectrum; standing up a parallel education-technology body would fragment the very coordination the DLCC exists to consolidate. Two adjustments follow. First, the DLCC's technical functions, content interoperability standards, EMIS 2.0 integration, device and platform specifications and data-protection protocols, should sit with a standing technical working group rather than the full committee; a National Research and Education Network (NREN), once established, is the appropriate institutional home for that group. Second, MoICT's co-chair role should be formalized through a memorandum of understanding that locates the DLCC's technical arm within MoICT's existing digital-transformation structure, so that education-sector coordination draws on MoICT's mandate and capacity rather than competing with it. This preserves MoGEI's ownership of the pedagogical and content agenda (Section 13.1) while routing infrastructure, interoperability and regulatory questions to the ministry already mandated to resolve them.

Figure 8 illustrates the DLCC governance architecture and Figure 9 shows the three-phase implementation pathway.

Figure 8: DLCC Governance Architecture. The Digital Learning Coordination Committee reports to MoGEI senior management at Undersecretary level or above. It is co-chaired by the MoGEI ICT Unit and MoICT ICT Policy Directorate. NCA participates as a regulatory observer. Full membership: MoGEI (ICT Unit, EMIS, Curriculum Division, Teacher Management), MoICT, NCA, UNICEF, UNESCO, Save the Children, MTN South Sudan, Zain South Sudan, IRC, WPDI. The UNICEF Education Specialist serves as technical secretariat for the first 24 months. The DLCC has five standing mandates: (1) content quality standard approval, (2) digital CPD channel coordination, (3) EMIS 2.0 digital infrastructure integration, (4) MNO commercial arrangement oversight and (5) data protection protocol development. Meeting frequency: monthly for Year 1, quarterly thereafter.

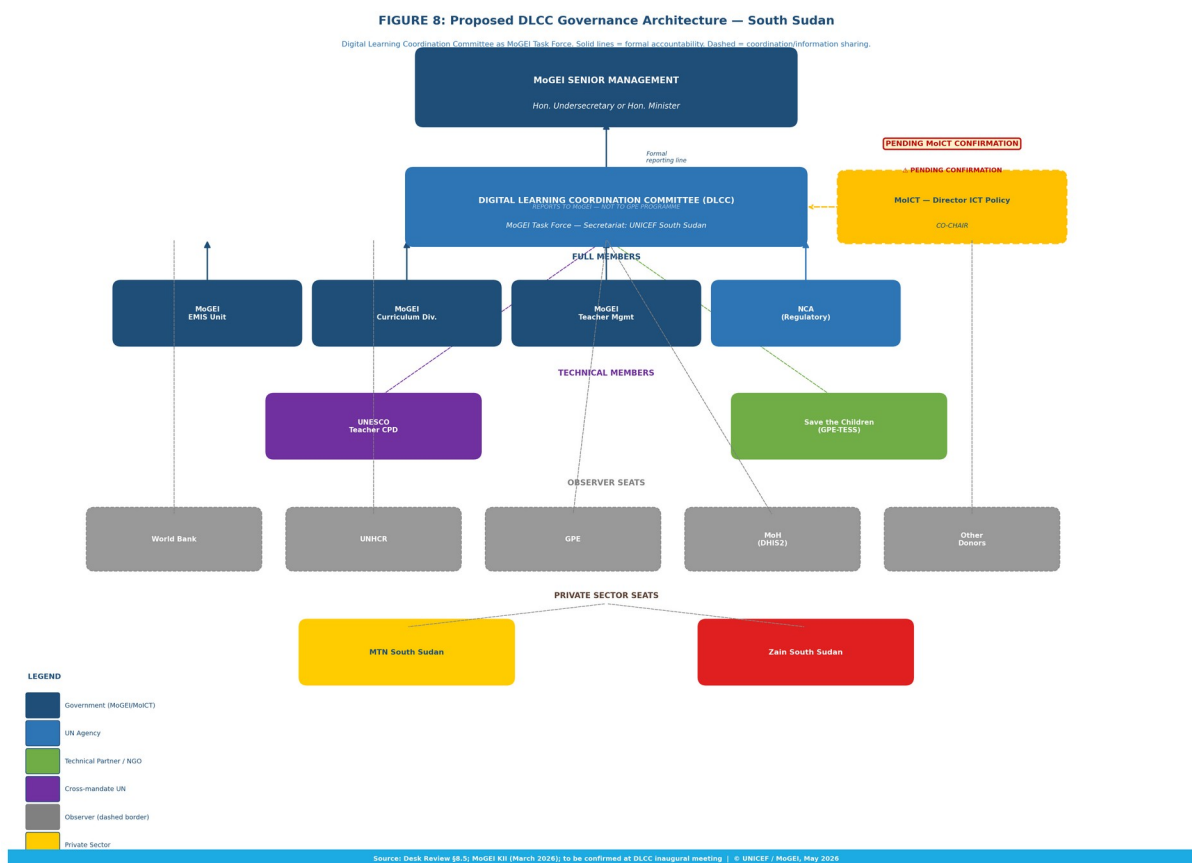


Figure 8: Proposed DLCC governance architecture, South Sudan. DLCC as MoGEI task force. Solid lines = formal accountability; dashed = coordination. MoICT co-chair pending confirmation. Source: Desk Review §8.5; MoGEI KII (March 2026).

Figure 9: Three-Phase Implementation Pathway. Phase 1 (Months 0–12, USD 67,000–112,000): governance foundation and evidence base. Phase 2 (Months 12–36, USD 610,000–1,000,000): pilot expansion and system integration, conditioned on Phase 1 governance conditions being met. Phase 3 (Months 36+, cost TBD): evidence-based scale-up, conditioned on Phase 2 EGRA/EGMA learning outcome data confirming measurable gains over control groups. Each phase boundary is a decision gate, not a calendar milestone. Phase 3 does not begin until Phase 2 evidence conditions are confirmed at a DLCC quarterly review.

FIGURE 5: Phased Implementation Pathway for Digital Learning Investment — South Sudan

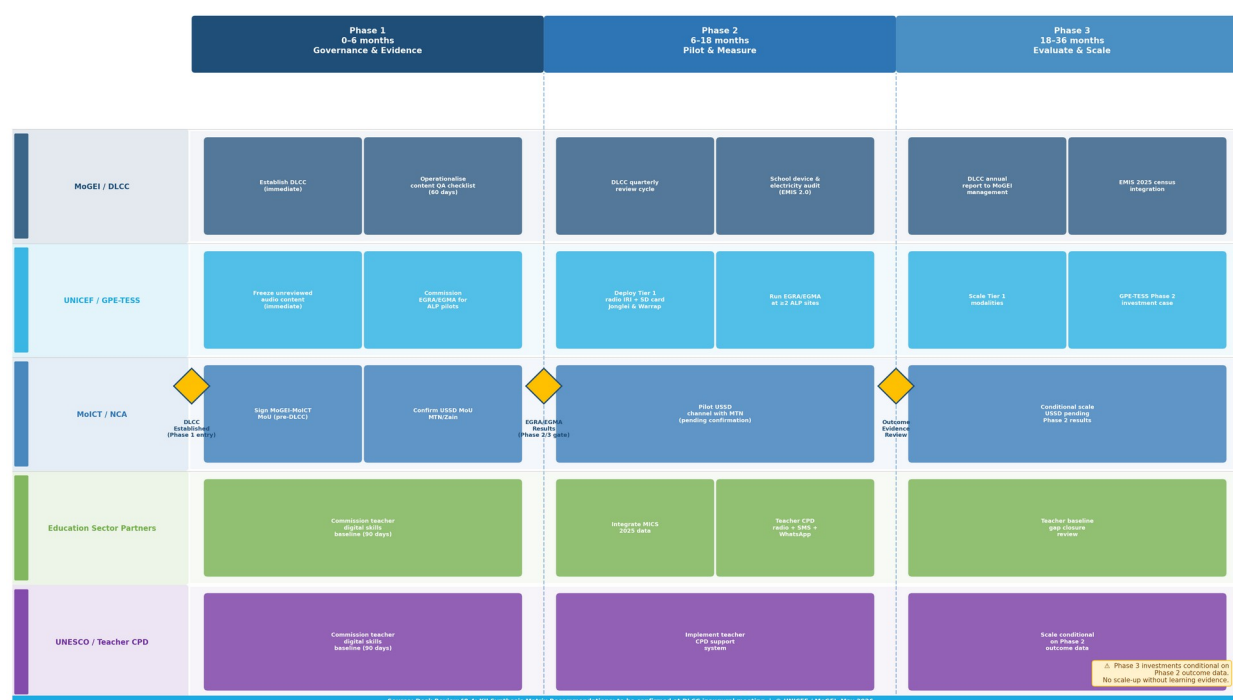
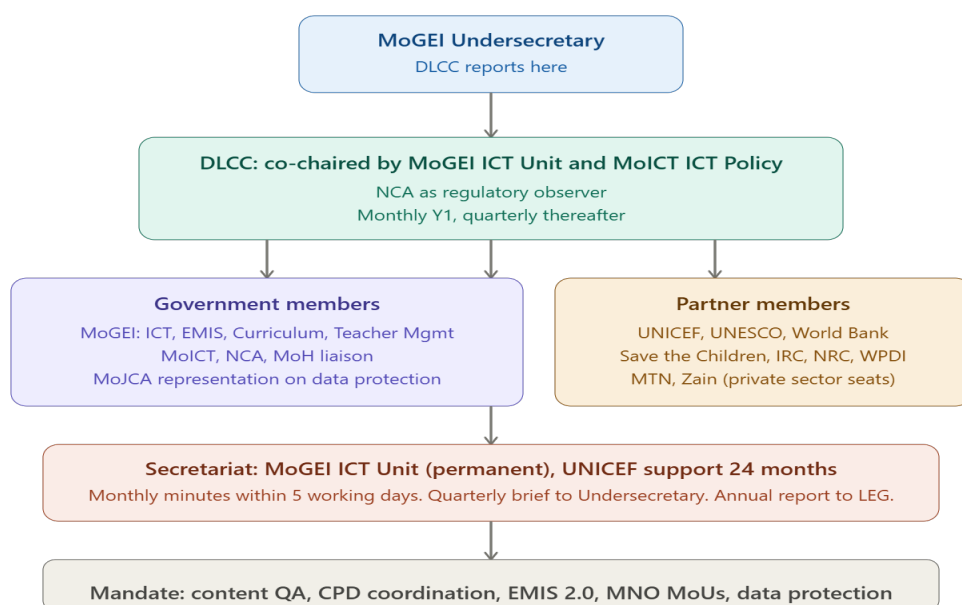


Figure 9: Phased implementation pathway for digital learning investment, South Sudan. Phase 1 governance actions are preconditions. Phase 3 scale-up conditional on Phase 2 learning outcome evidence. Source: Desk Review §8.4; KII Synthesis Matrix; DLCC inaugural meeting confirmation pending.

DLCC: a MoGEI task force with cross-ministerial seats



Membership spans government, multilateral, implementing partner and private sector: MoGEI (ICT Unit, EMIS, Curriculum Division, Teacher Management), MoICT, NCA, UNICEF, UNESCO,

Save the Children, MTN South Sudan, Zain South Sudan, IRC, WPD. Secretariat sits permanently in the MoGEI ICT Unit, with UNICEF providing financial and technical support for the first 24 months.

The mandate covers five areas: content quality standard approval (resolving the 65 per cent low-quality content problem), digital CPD channel coordination (preventing duplication across the six functioning channels), EMIS 2.0 digital infrastructure integration (ensuring school-level device and electricity data feeds modality selection), MNO commercial arrangement oversight (managing the MTN/Zain/Digitel MoU portfolio) and data protection protocol development (filling the gap identified by IRC regarding the absence of a national Data Protection Act).

Meeting frequency: monthly for the first year, quarterly thereafter. All EGRA/EGMA MEL data from Phase 2 pilots to be presented at DLCC quarterly meetings, creating an institutional accountability mechanism for learning outcome evidence. The DLCC's first task: present this landscape analysis at the inaugural meeting and adopt the Phase 1 work plan within 90 days of establishment.

7.4 Financing architecture

Three financing streams are identified. First, GPE-TESS programme funds (2024–2028): approximately USD 27 million total programme envelope, implemented through the Save the Children-led consortium. Digital learning is one component, not the entirety. Phase 1 governance costs (USD 67,000–112,000) are modest enough to absorb within existing programme budgets. Phase 2 pilot costs (USD 610,000–1,000,000) require dedicated budget allocation within the GPE-TESS Phase 2 design.

Second, MNO commercial arrangements. The zero-rating MoUs represent in-kind financing: MTN and Zain absorb the data transmission costs for educational traffic. The Educare presentation (Educare Organisation, 2025) identified additional private sector mechanisms: device funding campaigns, manufacturer partnerships for bulk purchase and government tax exemption to subsidize device prices. These mechanisms require NCA regulatory action and MoGEI/MoICT coordination through the DLCC.

Third, USAF. The USD 9M fibre backbone allocation and the 2 per cent annual MNO revenue stream represent the long-term government financing pathway. Activation requires NCA to establish an implementation agency and MoGEI to ensure education is specified as a priority (not merely eligible) expenditure category. This is a Phase 3 financing condition, not a Phase 1 assumption.

Historical context: USAID invested USD 30.1 million in the GPEP programme (2013–2016), roughly half the programme envelope (RTI International & OPM-Cynosure, 2017). The learning from GPEP is that large investment without governance infrastructure (content QA, teacher quality standards, independent MEL) does not produce sustainable gains. The Phase 1 governance investment recommended here is designed to prevent the same pattern from repeating with GPE-TESS digital learning funds.

8. Lessons from comparable contexts

Six cases inform this analysis: three cross-country (Eastern DRC, Somalia, Kenya/Rwanda) and two South Sudan cross-sector cases (DHIS2, Junub Academy Model 2). The South Sudan cases carry the highest weight because they provide direct evidence under the same infrastructure, governance and workforce conditions that education programmes face.

8.1 Eastern DRC: Facilitated tablet delivery in conflict settings

IRC and UNICEF deployed facilitated tablet programmes in Eastern DRC's conflict-affected provinces (North and South Kivu, Ituri), targeting displaced and host community learners. The central finding, confirmed across multiple evaluation rounds: facilitation quality was the primary predictor of learning gains. Device availability was a necessary condition but not a sufficient one. Sites with trained facilitators who attended regularly showed measurable learning improvements; sites without consistent facilitation showed no gains despite having the same hardware and content (IRC, 2023).

The DRC operating conditions are comparable to South Sudan's ALP and IDP contexts: conflict-affected settings, displaced populations, limited electricity, weak network infrastructure, low teacher training levels. The lesson is operational: if South Sudan deploys tablets to ALP sites or IDP-adjacent learning centres without a facilitation infrastructure plan (including facilitator recruitment, training, attendance tracking and compensation), the DRC evidence predicts that the investment will produce reach statistics but not learning gains. This is why Principle 3 gates all hardware procurement: no tablet purchase without a costed facilitation plan approved by the DLCC.

8.2 Somalia: Radio at national scale with IRI format

UNICEF and BBC Media Action's Radio programme in Somalia reached an estimated 1.5 million learners through Interactive Radio Instruction (UNICEF & BBC Media Action, 2020). The IRI format builds structured facilitator prompts, student response pauses (8–10 seconds of silence for students to answer before the radio gives the correct answer), singing, movement and verbal activity segments into each 20–30-minute broadcast. Community facilitators received a printed guide for each session with pre-broadcast preparation, in-broadcast activities and post-broadcast follow-up.

Facilitator attendance tracking was the key operational variable. Sessions with a trained community facilitator present showed significantly higher learning engagement than passive household listening. The programme tracked facilitator attendance through simple paper registers, with verification during monthly supervision visits. This low-cost accountability mechanism is directly transferable to South Sudan's Education on Air redesign.

The 50 new IRI-format P1–P3 lessons recommended for Phase 1 should be designed using the Radio template. The current Education on Air content uses a talk-heavy format without IRI elements (Curriculum Division, MoGEI, personal communication, March 2026). The format

difference is consequential: passive listening produces familiarity; interactive engagement with facilitator-guided response pauses produces measurable skill practice.

8.3 Kenya and Rwanda: USSD zero-rating precedents

Safaricom in Kenya and MTN Rwanda have operationalized zero-rated USSD and SMS learning interactions through government MoU frameworks, without requiring net-neutrality legislation. The regulatory mechanism is a government-MNO agreement designating specific short codes and platforms as public benefit services exempt from data charges. MTN Rwanda's model confirms that the commercial arrangement negotiated in South Sudan's March 2026 MTN MoU is replicable and has precedent in the East African market.

USSD is the only interactive modality that operates on the 2G footprint. In South Sudan, 2G covers more geographic area than 3G or 4G and 66.5 per cent of MTN subscribers use feature phones capable of USSD but not apps. Zero-rating removes the cost barrier. The remaining limitations are coverage (USSD requires live 2G signal, not just historical coverage) and content design (menu-driven interactions of 160 characters per screen must be designed for low-literacy users in national languages). The DLCC's role in this report serves an analogous function to the sense-making forums these East African programmes used: presenting the landscape analysis at the inaugural DLCC meeting gives MoGEI, UNICEF, UNESCO, MNOs and implementing partners a structured moment to discuss findings and adopt recommendations collectively rather than receiving them as external consultant advice.

These precedents point to a discrete, costed delivery channel the strategy should name explicitly: a telecom-integrated complementary model. It pairs two access mechanisms under a single MNO framework. For the smartphone minority (roughly a third of subscribers), zero-rated access to the Junub Academy platform removes the data-cost barrier; for the 66.5 per cent feature-phone majority, zero-rated USSD and SMS deliver menu-driven interactive learning and teacher-support content over the 2G footprint, on the Safaricom Shupavu291 and MTN Rwanda model. South Sudan already holds the regulatory scaffolding: the MTN-MoGEI-Educare zero-rating MoU (March 2026) and the 26-Minister Ministerial Communique (September 2024) calling to 'integrate e-learning into the telecom service' (Educare Organisation, 2025). The binding condition is measurement. No telecom-mediated programme in South Sudan currently reports learning-outcome data, and a zero-rated channel that scales reach without measuring effect would repeat the Education on Air pattern of distribution without evidence. Any USSD or zero-rating rollout must therefore embed outcome tracking from inception, with USSD interaction logs and platform analytics feeding the EMIS 2.0 dashboard (Section 4.1.8) and periodic EGRA/EGMA verification at facilitated sites. Framed this way, the telecom-integrated model is the scalability layer (Educare Model 1) above the facilitated offline classroom (Model 2), not a substitute for facilitation.

8.4 South Sudan DHIS2: Offline-first at national scale

DHIS2 is not a comparable-context reference from another country. It is operational evidence from the same infrastructure environment (7.2 per cent electricity, 15.8 per cent internet, 80 per cent poverty), the same institutional governance challenges and the same workforce constraints

that education programmes face. The system covers all 10 states and 80 counties, with 1,162 functional facilities reporting (World Health Organization & Ministry of Health South Sudan, 2025). The HIS maturity score of 40.5 per cent is classified as 'Minimal' by WHO standards, but the system's achievement is not maturity it is operational continuity under conditions where most digital systems fail entirely.

Four operational features are directly transferable: (1) offline-first synchronization (data entered without connectivity, synced when available via GSM); (2) solar charging cabinets (devices operate without grid electricity); (3) pictorial job aids (low-literacy users can operate the system); (4) Granular Site Management supervision (continuous onsite mentoring rather than workshop-based training). The county-level hub model, the hardware stack (Android tablets USD 80–120, solar cabinets USD 200–400, power banks USD 15–25) and the procurement channels are all available for direct adoption by education. The DHIS2 KII team explicitly recommended co-financing with education at county level.

8.5 Junub Academy model 2: Offline classroom evidence

The Junub Academy Model 2 offline classroom pilot provides the highest-weight evidence in this analysis because it was conducted under South Sudan's actual field conditions, by a South Sudanese organization (Educare), using MoGEI-aligned secondary curriculum content. The pilot enrolled 204 S2 students across Warrap Secondary School and Cueibet Secondary School (Lakes), with 112 experimental and 92 control students. Prerecorded video lessons were delivered via an offline server connected to a projector, with a dedicated facilitator for each session.

Results: Warrap recorded pass rate improvement from 22.0 per cent to 71.0 per cent; Cueibet from 30.3 per cent to 75.5 per cent (Educare Organisation & MoGEI, personal communication, March 2026). Equipment reliability was tested under field conditions and described as sufficient for pilot purposes. The pilot represents the only pre-test/post-test digital learning outcome data available in South Sudan.

The results are encouraging but the evidence base is narrow: secondary level (not primary or ALP), four subjects, two schools, 204 students. Extending the model requires curriculum alignment at lower grade levels (currently serves S4), content production in national languages (not currently available on the platform) and facilitator support design for low-literacy contexts. The Educare Organisation's four-model framework positions Model 2 as one of four delivery channels, with Model 1 (zero-rated telecom) as the scalability mechanism and Model 3 (school digital library) as the institutional anchor (Educare Organisation, 2025). Phase 2 should pilot all three applicable models simultaneously, with EGRA/EGMA integration from the outset.

8.6 Cross-cutting lessons

Four lessons recur across all six cases. First, facilitation determines outcomes: every case with learning outcome data attributes gains primarily to facilitation quality, not device quality or content volume. Second, offline-first is achievable: DHIS2 in South Sudan and facilitated tablet programmes in DRC demonstrate that offline-first digital systems operate at county/district scale

in fragile contexts. Third, commercial partnerships are negotiable: Kenya, Rwanda and the South Sudan MTN MoU confirm zero-rating through government-led frameworks. Fourth, government stewardship determines sustainability: programmes that run on implementing partner capacity do not survive funding transitions. The DLCC and USAF activation are the South Sudan mechanisms for government stewardship.

8.7 Prospects for emerging technologies and artificial intelligence

Artificial intelligence is reshaping education delivery globally, and contexts affected by fragility have a distinct claim on its potential: where teacher supply is structurally short, adaptive technologies can extend the reach of scarce pedagogical expertise, and where learning disruption is recurrent, system intelligence can detect and respond to exclusion faster than manual reporting cycles. For South Sudan the question is not whether AI is relevant, but which applications survive contact with the country's constraints: 15.8 per cent internet penetration, smartphone ownership at roughly a third of mobile subscribers, no national Data Protection Act and the platform liability provisions of the Cybercrime and Computer Misuse Act, 2026. The offline-first principle that governs every other recommendation in this analysis applies with equal force to AI: applications that require continuous cloud connectivity are non-starters for the learners this analysis centres.

The in-country evidence base is thin but instructive. IRC's ApreDIA platform and virtual Teacher Learning Circles (Section 4.1.5) are the only confirmed AI-enabled education tools operating in South Sudan, and their entry point is significant: AI arrived through teacher support, not learner-facing tutoring. This sequencing is correct for the context. Teacher-facing applications tolerate asynchronous, low-bandwidth operation, concentrate benefit on the system's scarcest resource and carry lower child data protection exposure than applications that profile individual learners.

Four near-term applications are consistent with the six principles in Chapter 9. First, an early warning system for dropout risk: as decentralized EMIS collection matures (Section 4.1.8), attendance and enrolment data from county hubs can flag learners at elevated risk of dropping out and trigger follow-up by facilitators or community focal points before the child disengages, closing the loop from detection to intervention to retention reporting. This should begin as simple rules-based flags (consecutive absences, term-on-term enrolment lapses) and graduate to predictive models only when data quality and protection frameworks justify it. Second, AI-assisted content localization: language models can accelerate first-draft production of national-language audio scripts and levelled reading materials for human review by NCDC and native-speaker educators, attacking the content localization gap identified as a HIGH risk in Chapter 10 at a fraction of conventional production cost. Third, on-device adaptive practice: offline platforms of the Kolibri class increasingly embed adaptive sequencing that runs locally on Android hardware, allowing differentiated practice in multigrade and ALP settings without connectivity. Fourth, expanded AI-supported CPD: the ApreDIA/vTLC model extended through the blended CPD architecture in Section 5.2, with WhatsApp-based chatbot support where smartphones exist and structured prompts delivered by radio and print where they do not.

The preconditions matter more than the technology. The DLCC's data protection mandate (Section 7.3) must produce an approved protocol before any AI application touches learner-level data; no biometric collection or individual learner profiling should proceed in the absence of a national legal framework; and Section 42 liability exposure requires legal review for any platform hosting AI-generated content accessible to children. Phase 2 should pilot one bounded application, the dropout early warning system in the three hub counties, with an explicit evaluation design, and Principle 6 (measurement before scale) should govern any expansion. Treated this way, AI is not a parallel agenda but an extension of the system-strengthening logic of this analysis: it makes the data the system already collects work harder for the children most likely to be lost from it.

9. Six digital learning principles for UNICEF and MoGEI

These six principles define how investment decisions should be made, modalities selected, programme phases sequenced and the success of digital learning judged. Each is derived from operational evidence in this analysis and from documented failures in existing programmes. Together, they set the binding logic for engagement under South Sudan's constraints.

Every recommendation in this chapter advances a single objective: quality digital learning for every child in South Sudan, including the most remote, the most displaced and the most systematically excluded.

9.1 Principle 1: Offline-first is an equity requirement

Electricity access stands at 7.2 per cent nationally (World Bank, 2022; NCA, 2021). Only 2 per cent of schools have reliable electricity (MoGEI & UNICEF, 2021). Internet penetration is 15.8 per cent (DataReportal, 2026). Smartphone penetration is 10.5–11 per cent (World Bank, 2022; MTN South Sudan, personal communication, March 2026). Only 4 per cent of the population lives within 10km of a fibre node and only 7 per cent within 50km (World Bank, 2022). South Sudan's road density is the lowest in Africa at 15km per 1,000 square km of arable land (World Bank, 2022).

These five indicators together define the outer boundary of digital modality viability. Any programme component that assumes connectivity or household device access as a baseline condition is not designed for South Sudan's actual infrastructure. It is designed for a different country's conditions transposed onto South Sudan's geography. Radio broadcast and SD card distribution are the primary delivery infrastructure for the 2.8 million OOSC. All other modalities are supplements to that base, not replacements for it.

The Educare Organisation has acknowledged this reality in its prioritized delivery models. Telecommunications networks are described as 'the only nationwide infrastructure capable of supporting e-learning service delivery at scale' (Educare Organisation, 2025). The organization has prioritized zero-rated telecom access, offline classroom delivery and mobile-first design as its response to these constraints. The principle formalizes what practitioners already know: offline-first is not a fallback; it is the design starting point.

9.2 Principle 2: Structurally excluded learners at the centre

Girls (53 per cent of OOSC), 472,452 IDP children, 189,000+ ALP learners, children with disabilities, nomadic populations and children in Unity (82 per cent OOSC) and Jonglei (81 per cent OOSC) must be the primary test for any proposed modality. The World Bank DE4A assessment documented a stark gender gap across all key indicators (World Bank, 2022). The GESP 2023–2027 identifies Unity and Jonglei as the two states with the highest OOSC rates among children aged 6–13.

The ‘Unity/Jonglei design test’: a modality that cannot function under these two states’ conditions no grid electricity, 15–25 per cent mobile broadband, frequent displacement, 2G coverage at best cannot be the primary reach vehicle for South Sudan’s most unserved populations. Structural exclusion must be named explicitly in modality selection decisions, not softened in equity annexes or addressed as a cross-cutting theme without operational consequences. GSMA’s Connected Women programme data across Sub-Saharan Africa confirms that women and girls face a consistent 20–30 per cent mobile internet usage gap relative to men even where coverage exists, driven by household control of devices, safety concerns and social norms (GSMA, 2023). In South Sudan’s context, where female rural smartphone access is estimated below 8 per cent, the exclusion is structural rather than a gap to be bridged by content design alone.

9.3 Principle 3: Facilitation determines outcomes

The Junub Academy Model 2 pilot recorded pass rate improvements from 22 per cent to 71 per cent (Warrap) and 30.3 per cent to 75.5 per cent (Cueibet) with dedicated facilitators present for every session (Educare Organisation & MoGEI, personal communication, March 2026). IRC’s Eastern DRC evidence from facilitated tablet programmes found that unmonitored sites showed no gains. UNICEF/BBC Media Action’s Radio in Somalia found that facilitator attendance was the single strongest predictor of learning engagement. The DHIS2 Granular Site Management model confirmed that shifting from compliance supervision to onsite coaching improved data quality across 1,162 facilities.

MoGEI Teacher Management (Teacher Management Directorate, MoGEI, personal communication, March 2026), Save the Children (Save the Children International respondent, personal communication, March 2026) and UNESCO (UNESCO respondent, personal communication, March 2026) independently assessed the master trainer cascade model as not feasible at scale as a standalone CPD vehicle. The practical implication: every hardware procurement proposal must include a facilitation infrastructure plan costed and staffed before it is approved by the DLCC. Hardware without facilitation infrastructure is not an investment in learning; it is an asset deployment with no outcome pathway.

9.4 Principle 4: Governance before scale

The Technical Review Committee mandated by MoGEI NCDC policy is not yet operational. As a direct consequence, 65 per cent of 361 audio lessons distributed on 3,000+ USB sticks were rated low quality (Curriculum Division, MoGEI, personal communication, March 2026). The

DLCC does not yet exist. No teacher digital competency framework is in active use. The ICDL programme documented in the World Bank DE4A (Box 6, p.59) remains small-scale and disconnected from formal CPD structures.

These are not implementation gaps that faster programme rollout will resolve. They are the conditions that determine whether any programme investment can be maintained, quality-assured and sustained after the GPE-TESS funding cycle ends in 2028. The DLCC must be established within 90 days of this report's finalization as the prerequisite for all Phase 2 investment. This is the single most time-sensitive recommendation in the analysis. The 90-day clock applies to formal gazettelement, an administrative act that requires no new budget or staffing, not to full operational maturity: the coordination tasks that depend on MoGEI capacity, content quality-assurance, the MEL work plan, the digital asset register, each carry their own 60-to-90-day windows once the committee exists, sequenced deliberately because MoGEI's coordination capacity cannot absorb all of it in a single step. The World Bank DE4A assessment identified the same governance-implementation gap across South Sudan's entire digital economy: "institutional governance is in place" but implementation mechanisms lag the policy architecture (World Bank, 2022, p. 25). Digital learning is not an exception to this pattern; it is one of its clearest expressions.

9.5 Principle 5: Use what works in the same environment

DHIS2 operates across all 80 counties under exactly the infrastructure conditions education programmes face. It is not a comparable context analogy. It is operational proof from the same country, the same electricity constraints, the same governance architecture and the same workforce conditions. The county hub model, the GSM supervision approach, the Android tablet/solar cabinet hardware stack and the offline-sync architecture are available for direct transfer to education without new-infrastructure investment.

The MTN-MoGEI-Educare MoU (10 March 2026) confirms that commercial arrangements for public-benefit digital services can be achieved through government-led negotiation. Zain approval is confirmed, Digitel has offered server and hosting services (Educare Organisation, 2025). The design task is integration and sustained operation, not invention from scratch.

9.6 Principle 6: Measurement before scale

ALP enrolment exceeds 189,000 learners. Zero outcome data exist from any ALP digital pilot site (Data Gap 4: CRITICAL). The GESP 2023–2027 EGRA baseline stands at 39.1 per cent correct at Grade 3. The Montrose 2016 diagnostic found 45 per cent of P3 learners scoring zero on reading comprehension and 92 per cent unable to sound a single letter. The Junub Academy Model 2 pilot provides the only pre-test/post-test data: 204 secondary students, two schools, four subjects.

The GPEP experience provides a cautionary precedent. USAID invested USD 30.1 million (RTI International & OPM-Cynosure, 2017). The endline revealed that teacher-selected student samples at baseline had produced inflated scores; some Lakes State sites recorded 100 per cent pass rates (Cambridge Education, 2018). When genuine randomized sampling was applied

at endline, reading comprehension dropped from 43 per cent to 17 per cent not programme regression, but the unveiling of a baseline that never reflected actual performance.

Every Phase 2 programme component must integrate EGRA/EGMA baseline measurement before procurement is approved. Randomized student selection is mandatory. Teacher-selected sampling is prohibited. ALP digital investment must be conditional on a commissioned baseline, not on the existence of enrolment data. This is not a monitoring recommendation. It is the minimum accountability standard for programmes claiming to serve the most excluded learners.

A programme that satisfies Principles 1 to 3 but not Principle 4 will not survive the GPE-TESS funding cycle. One that satisfies Principles 1 to 4 but not Principle 6 cannot be scaled responsibly. All six operate as a system. They are not a menu.

10. Critical risks to scale: Unresolved data gaps

Of ten data gaps identified in Phase 1, none were fully closed by KII evidence. Six achieved partial resolution (Gaps 1, 2, 3, 6, 7 and 9), three remain unresolved (Gaps 4, 5 and 8) and one was addressed through quality data rather than cost data (Gap 10). Gap 9 (teacher digital skills baseline) has been upgraded from UNRESOLVED to PARTIAL following integration of Digital 2026 proxy data; a population-level baseline remains absent. These are not analytical inconveniences. They are active risks to the quality, scale and sustainability of digital learning investment: gaps are presented as decision risks, not knowledge limitations, with severity ratings and mitigation actions forming the basis for Phase 1 activity design.

10.1 R1: ALP learning outcomes gap (CRITICAL)

Data Gap 4. 189,000 ALP learners enrolled. Zero outcome data from any ALP digital pilot site. Scale-up investment without a commissioned EGRA/EGMA baseline risks replicating the structural failure that undermined GPEP: reach statistics substituting for learning evidence, followed by scale-up decisions that cannot be evaluated. The GPEP endline lesson (Cambridge Education, 2018) is directly applicable: without independent randomized assessment, inflated baselines mask the absence of genuine gains and scale-up decisions rest on false evidence.

Mitigation: commission ALP-specific EGRA/EGMA baseline through MoGEI and OPM before any ALP digital procurement is approved. Design with a control group. Randomized student selection mandatory.

Severity: CRITICAL. This gap blocks all Phase 2 ALP digital investment.

10.2 R2: Teacher digital skills baseline (HIGH)

Data Gap 9. No population-level quantitative baseline of teacher digital skills exists. The World Bank DE4A mapped South Sudan at the 'Foundation' level of DigComp 2.1 (World Bank, 2022)

as an illustrative assessment, not a measured distribution. The Digital 2026 Report provides the strongest available proxy evidence: national adult digital literacy is significantly below the already low 34.5 per cent adult literacy rate, and 27.8 per cent of internet non-adopters nationally cite “lack of skills to use the internet” as their primary barrier (DataReportal, 2026). This is consistent with the UNESCO fieldwork finding that ICT instruction in teacher training institutions is theoretical only, with no functional computer labs. The proxy evidence bounds the lower end of the skills deficit but does not resolve the allocation question that drives CPD investment risk: without measured skill distribution data, decisions about which CPD entry level to target, which channels to fund and which teachers to prioritize remain based on a hypothetical workforce profile rather than a measured one. Gap status updated to PARTIAL: proxy indicators available from Digital 2026; population-level baseline absent. The risk rating remains HIGH.

The risk is mistargeting. If 85 per cent of teachers are at UNESCO ICT-CFT Level 0 (no digital exposure), then a CPD programme designed for Level 1 (Technology Literacy) will still overshoot. If 30 per cent are already at Level 1, then universal Level 0 training wastes resources on teachers who don’t need it. Only a measured baseline resolves this allocation question.

Mitigation: commission national baseline within 90 days of DLCC establishment. Joint MoGEI-UNESCO lead. Estimated cost USD 40,000–70,000 (UNESCO South Sudan, 2022). Tablet-administered using contextualized ICT-CFT Level 1 rubric with pictorial and audio elements.

Severity: HIGH. Misaligns all CPD investment without resolution.

10.3 R3: Unit cost gap (HIGH)

Data Gap 5. Planning proxies from comparable fragile contexts have a 3–5x variance range: radio at USD 1–5/child/year, facilitated tablet at USD 15–40, VSAT hub at USD 50–150 (desk review estimates). South Sudan’s cost environment may differ significantly due to logistics costs (World Bank, 2022), import taxes (20 per cent on devices, MTN KII) and security-related access constraints in Jonglei, Unity and Warrap.

Mitigation: commission South Sudan-specific unit cost study in Phase 1 (Month 3–6) covering radio, SD card, USSD and facilitated tablet modalities before Phase 2 allocation is finalized.

Severity: HIGH. Risks under/over-allocation in Phase 2 budget design.

10.4 R4: USAF implementation gap (HIGH)

Data Gap 2 (PARTIAL). USD 9 million approved for fibre backbone design. No implementation agency exists. The World Bank DE4A recommended leveraging private sector capital and development partner de-risking support (World Bank, 2022, p. 33). Without an institutional mechanism, USAF revenue cannot be deployed for education connectivity, device procurement or bandwidth subsidies.

Mitigation: NCA to prioritize establishing an implementation mechanism. MoGEI to ensure education is specified as a priority eligible category. DLCC to include USAF as a standing agenda item.

Severity: HIGH. Blocks the government financing pathway for Phase 3.

10.5 R5: Content quality gap (HIGH ACTIVE RISK)

Data Gap 7 (PARTIAL). 65 per cent of 361 radio audio lessons distributed on 3,000+ USB sticks rated low quality by MoGEI review (Curriculum Division, MoGEI, personal communication, March 2026). Only 72 (20 per cent) were properly sequenced for primary level. The Technical Review Committee mandate exists but the QA checklist is not operationalized. This is not a future risk; it is an active risk in the current programme. Content is being distributed now that fails its own quality standard.

Mitigation: operationalize QA checklist within 90 days of DLCC establishment. Freeze further distribution of unreviewed content. Prioritize the 72 sequenced lessons for redistribution. Commission 50 new IRI-format lessons in five national languages.

Severity: HIGH. Active risk in current programme distribution.

10.6 Risk summary

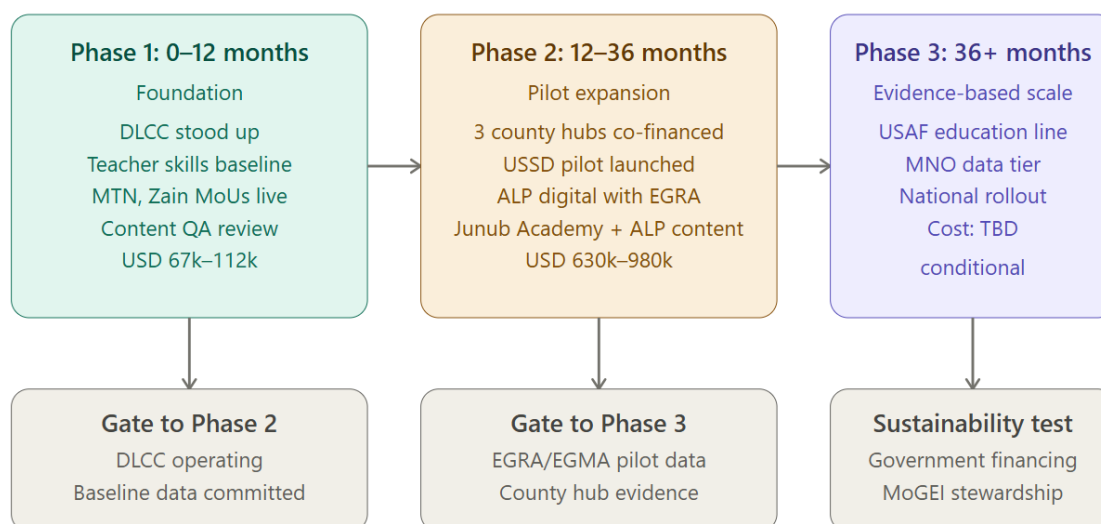
Of five risks, R1 (ALP outcomes) and R2 (teacher digital skills) are the most consequential for Phase 2 decision quality. Both are addressable within Phase 1 if the DLCC is established and resourced within 90 days. R5 (content quality) is unique in being an active risk in a currently operating programme, making its resolution the most time-sensitive after DLCC establishment itself. The total cost of mitigating all five risks in Phase 1 is estimated at USD 67,000–112,000, a fraction of the Phase 2 pilot budget of USD 610,000–1,000,000 that depends on these risks being resolved.

11. Three-phase strategic roadmap

Six recommendations from this analysis are sequenced into three phases. The phasing follows the dependency logic established by the six principles. Principle 4 (governance before scale) means Phase 1 activities are prerequisites for Phase 2 investment, not parallel tracks. Principle 6 (measurement before scale) means Phase 3 decisions are explicitly conditioned on Phase 2 learning outcome data. This is not a timeline; it is a dependency chain. Phase 2 cannot begin until Phase 1 governance conditions are met. Phase 3 cannot begin until Phase 2 evidence conditions are met.

See Figure 8 (Chapter 7.3) for the three-phase implementation pathway.

Three phases. Each gate is conditional on Phase 2 evidence.



11.1 Phase 1: Governance foundation and evidence base (Months 0–12)

Phase 1 establishes the structural conditions without which Phase 2 investment cannot be justified. The total indicative cost is USD 67,000–112,000, comprising DLCC secretariat support (USD 15,000–25,000), teacher digital skills baseline (USD 40,000–70,000) and content QA review (USD 12,000–17,000).

Action 1: Establish DLCC (Month 1–2). Issue DLCC directive within 30 days. Sign inter-ministerial MoU (MoGEI–MoICT) within 90 days. Present this landscape analysis at the inaugural DLCC meeting as the evidence base for the first work plan. The Educare Organisation's Junub Academy programme, the Education on Air content review, the EMIS 2.0 transition, and the MNO MoU portfolio all require coordination that currently does not exist. The DLCC is the mechanism.

Action 2: Teacher digital skills baseline (Month 2–3). Issue joint TOR with UNESCO. MoGEI provides EMIS teacher sampling frame. UNICEF funds the baseline. The assessment should use a contextualized version of UNESCO ICT-CFT Level 1, adapted for the workforce profile: 70 per cent untrained, 40 per cent volunteers, adult literacy at 35 per cent. The World Bank DE4A's DigComp 2.1 mapping (Box 4, p.57) provides the framework reference; the baseline provides the measured data to replace the illustrative estimate with actual skill distribution.

Action 3: Operationalize MNO zero-rating MoUs (Month 1–3). MTN MoU: operationalize within 90 days and establish usage tracking. Zain MoU: complete negotiation within 90 days. Digital: formalize server and hosting offer. NCA: design unified social good data tier covering education (Junub Academy), health (DHIS2) and administration (EMIS 2.0) under a single government-MNO framework. The Educare Organisation's platform design is already optimized for zero-rated delivery and limited bandwidth (Educare Organisation, 2025); the regulatory task is formalization, not technical development.

Action 4: Content quality review (Month 2–4). Review all 361 radio/USB lessons against MoGEI NCDC scope and sequence. Prioritize 72 properly sequenced lessons for immediate redistribution. Freeze distribution of the remaining 289 lessons pending review. Commission 50 new IRI-format lessons in five national languages (Bari, Dinka, Nuer, Zande, Toposa) for P1–P3, using the Somalia Radio template with built-in facilitator prompts, student response pauses and community facilitator guides.

Action 5: EGRA/EGMA MEL framework (Month 1–6). Integrate EGRA/EGMA baseline measurement into all Phase 2 digital programme designs before any procurement is approved. Present the framework at the DLCC Month 2 meeting. Randomized student selection is mandatory at all assessment points. Teacher-selected sampling is explicitly prohibited, based on the GPEP endline lesson (Cambridge Education, 2018). Control group design at all pilot sites.

Action 6: Commission unit cost study (Month 3–6). South Sudan-specific unit costs for radio, SD card, USSD and facilitated tablet modalities. Required before Phase 2 investment allocation. The study should account for logistics costs (World Bank, 2022), import taxes (20 per cent + 25 per cent, MTN KII), security access constraints and seasonal flooding disruptions to distribution chains.

11.2 Phase 2: Pilot expansion and system integration (Months 12–36)

Phase 2 expands validated approaches with evidence-conditioned investment. Indicative cost: USD 610,000–1,000,000, comprising county hub infrastructure (USD 200,000–350,000), ALP baseline and pilot (USD 120,000–200,000), national language content production (USD 150,000–250,000), CPD mentoring programme (USD 80,000–120,000) and USB distribution (USD 60,000–80,000).

Action 7: County Digital Learning Hubs (3 pilots). Co-locate with County Education Departments in Jonglei, Unity and Warrap the three GPE-TESS priority states with the highest OOSC rates. Co-finance hardware with MoH DHIS2 infrastructure: same Android tablets, same solar charging cabinets, same offline-sync architecture. Apply the DHIS2 Granular Site Management supervision model. Success indicators: 3 hubs operational, monthly data sync rate ≥ 80 per cent, facilitator attendance ≥ 70 per cent.

County readiness as the binding constraint on hub viability. Whether the hub model works in practice will be determined less by hardware than by the operational capacity of the County Education Department that hosts it. State-level OOSC concentration identifies where need is greatest, but need and execution capacity are not the same variable and are often inversely correlated: the counties with the highest exclusion rates frequently have the thinnest administrative staffing, the weakest supervision routines and the least reliable reporting discipline. The DHIS2 experience demonstrates that county-level digital operations are achievable in South Sudan (76 of 80 counties operational; Section 3.5), but it also shows what that achievement required: a designated and trained focal point at county level, a granular site supervision routine, secure equipment storage and a maintained solar power installation. None

of these can be assumed to exist in a County Education Department by default, and the GESP target of seven tutors per county remains uncoded (Section 5.2).

Hub site selection within the three pilot states should therefore be preceded by a structured county readiness assessment, conducted jointly by MoGEI and UNICEF before procurement, scoring each candidate county against five criteria: (1) a staffed County Education Department with a designated digital learning focal point; (2) an operational DHIS2 county hub on or near the proposed co-location site, as a tested proxy for power maintenance and supervision capacity; (3) lockable, secure storage for devices and solar equipment; (4) a functioning or under-rehabilitation County Education Centre within the county; and (5) demonstrated reporting discipline, proxied by the county's DHIS2 monthly sync rate and EMIS submission history. Counties meeting at least four criteria should pilot first. Counties meeting two or fewer should be explicitly deferred to Phase 3, with Phase 2 used to build the missing capacity rather than to deploy hardware into an administrative vacuum, since the predictable failure mode of the hub model is not technical but operational: devices delivered to a county office that lacks the staff, storage or supervision routine to manage them. The same readiness scores should populate the DLCC Risk Register as the baseline for monitoring subnational execution risk.

Action 8: USSD learning pilot. Launch zero-rated USSD learning interaction channel for ALP and P4–P6 learners. Pilot in Central Equatoria where 2G connectivity is viable. The feature phone addressable population (66.5 per cent of MTN subscribers) makes USSD the widest-reach interactive modality. Track usage rate, interaction depth, completion patterns and dropout points. Content must be designed for low-literacy users in national languages: 160-character menu screens with simple response options.

Action 9: ALP digital pilot with EGRA/EGMA baseline. Commission ALP-specific EGRA/EGMA baseline using randomized student selection. Design pilot with a control group that receives the same facilitation without digital content, to test attribution. No procurement before baseline is complete. This is the single most consequential evidence action in Phase 2.

Action 10: Junub Academy extension to ALP and national languages. Commission content production for ALP level in five prioritized languages. Curriculum alignment with MoGEI NCDC. Facilitator support design for low-literacy contexts. The Educare Organisation's four-model framework provides the delivery architecture; the missing piece is ALP-appropriate content at primary-equivalent level in national languages.

Action 11: CEC digital CPD programme (3 states). Pilot the DHIS2 GSM-adapted supervision model in three states. County education officers equipped with tablets and standardized lesson observation checklists conduct monthly school visits. Results fed into a dashboard visible to state supervisors. Success indicators: mentoring data available; facilitator attendance ≥ 70 per cent; qualitative improvement in observed teaching practices.

Action 12: Distribute 5,000 USB sticks (post-QA content only). Target flood-affected and remote schools in Jonglei, Unity and Warrap. Zero tolerance for distribution of content that has not passed MoGEI NCDC QA review. This corrects the current trajectory where 65 per cent low-quality content is being distributed at scale.

11.3 Phase 3: Evidence-based scale-up (Months 36+)

Phase 3 scale-up decisions are explicitly conditioned on three evidence conditions from Phase 2. First, learning outcome data from the ALP digital pilot: measurable EGRA/EGMA gains over the control group, with randomized student selection confirmed in the design. Second, operational evidence from the three-county digital learning hub pilots: data sync rate ≥ 80 per cent, hub operational continuity, facilitator attendance ≥ 70 per cent and data quality scores comparable to DHIS2 benchmarks. Third, DLCC governance maturity: the committee is operational, meets at scheduled frequency and has approved at least one content quality standard and one CPD framework.

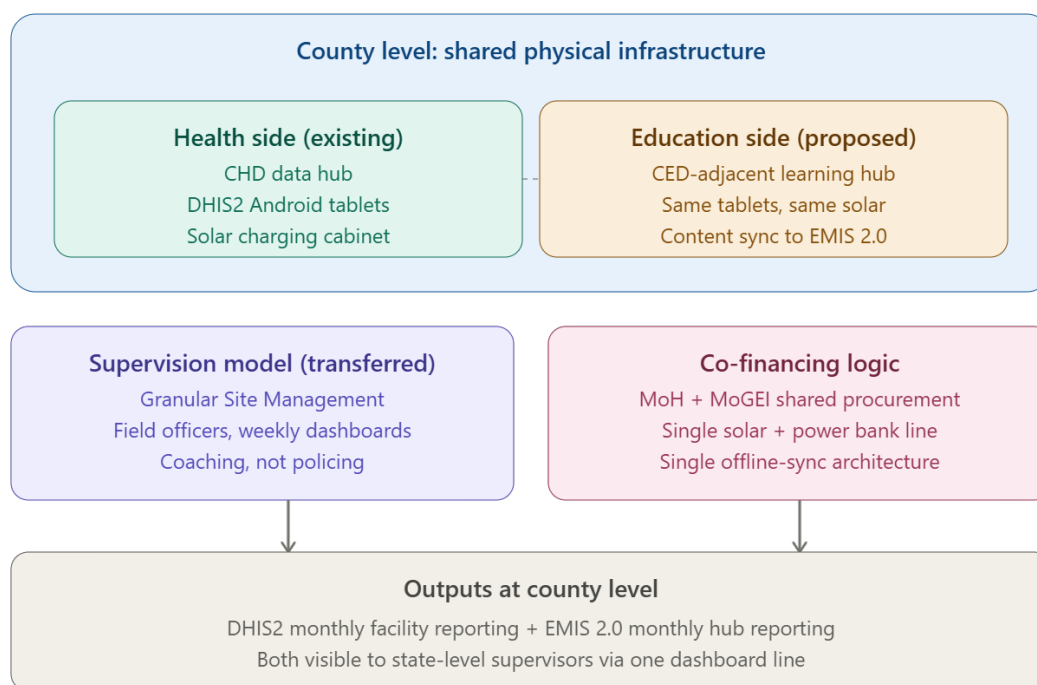
If any of these conditions is not met, the relevant scale-up decision is deferred, not cancelled. The evidence logic is directional: Phase 3 proceeds where Phase 2 evidence supports it and pauses where it does not. This prevents the common fragile-context pattern where scale-up is driven by disbursement pressure or programming deadlines rather than evidence.

government financing through USAF education allocation is the target mechanism for Phase 3, contingent on NCA establishing an implementation mechanism. MNO co-financing through a unified social good data tier agreement (covering education, DHIS2 and EMIS 2.0) is the second pathway. UNICEF's role in Phase 3 shifts from primary funder and implementer to technical advisory and quality assurance, consistent with the sustainability logic of the DLCC design.

Figure 10 shows the County Digital Learning Hub architecture, including the cross-sector co-financing model with DHIS2.

Figure 10: County Digital Learning Hub Architecture. The hub is co-located with the County Education Department and co-financed with MoH DHIS2 county infrastructure. Hardware stack: Android tablets (USD 80–120 per unit), solar charging cabinet (USD 200–400), power banks (USD 15–25). Connectivity architecture: offline-first, periodic GSM (Global System for Mobile Communications) sync when available. Functions served from one physical site: EMIS data collection, DHIS2 health data entry, digital content distribution (Kolibri/Junub Academy) and teacher CPD (lesson observation checklists, Tangerine-based skills assessment). Supervision model: Granular Site Management (GSM) adapted from DHIS2, with monthly county education officer visits replacing compliance monitoring with coaching visits.

County Digital Learning Hub: layered onto DHIS2 architecture



11.4 UNICEF added value

UNICEF's comparative advantage in South Sudan's digital learning system is institutional position and technical credibility. Four specific contributions distinguish UNICEF's role from what other partners can provide.

First, MEL authority. UNICEF holds primary technical oversight for the GPE-TESS consortium, giving it the authority to set EGRA/EGMA requirements and content quality standards that consortium members must follow. No other partner has this authority within the GPE-TESS governance structure.

Second, commercial partnership capacity. UNICEF's involvement in the MTN-MoGEI-Educare MoU demonstrates that it can open commercial arrangements that MoGEI cannot easily negotiate alone. The zero-rating MoU was signed with UNICEF as a facilitating party; extending this model to Zain, Digitel and the unified social good data tier requires UNICEF's continued convening role.

Third, cross-sectoral positioning. UNICEF's involvement in DHIS2 (health), EMIS (education) and the ALP programme places it uniquely to broker the county hub co-financing model between MoGEI and MoH. No other partner has operational relationships in both sectors at county level.

Fourth, evidence enforcement. UNICEF can enforce the EGRA/EGMA integration requirement through its MEL oversight role, preventing the pattern documented in GPEP where reach measurement substituted for learning outcome evidence and inflated baselines went unchallenged until the endline.

12. Risk mitigation framework

Scaling digital learning in South Sudan involves three intersecting risk categories: Technical (device and infrastructure failure), Logistical (supply chain, geographic access and human capacity) and Social (community acceptance, child safety and gender dynamics). Each category carries risks specific to South Sudan's conflict-affected, low-infrastructure context that generic digital programme design does not anticipate. The table below presents the twelve highest-priority risks, their likelihood and impact under South Sudan conditions and the mitigation strategies that apply in the first two phases of implementation.

Risk ratings use a two-dimension matrix: Likelihood (High/Medium/Low, based on documented precedent in the current programme inventory or comparable fragile-state contexts) and Impact on learning outcomes (High/Medium/Low). Risks rated High-High are treated as Phase 1 prerequisites: if the mitigation strategy is not in place, the associated programme component should not proceed to Phase 2. Risks rated Medium or below are actively monitored through the DLCC Risk Register, updated quarterly.

Risk Category	Specific Risk	Likelihood	Impact	Mitigation Strategy	Owner
Technical	Device failure and battery degradation under field conditions (heat, dust, humidity). Junub Academy Model 2 noted equipment reliability concerns without reporting failure rates numerically.	High	High	Phase 1: Procure devices rated for operating temperatures of 40°C+ (e.g., Acer Chromebook or Lenovo 300e ruggedized models used in comparable DRC deployments). Require supplier warranty of 24 months with in-country service. Phase 2: Maintain 15% spare-device buffer at county hub level. Monthly device health checks by CEC digital officer.	UNICEF / MoGEI ICT Unit
Technical	Solar system failure due to poor installation, panel damage or battery replacement costs. Off-grid solar is a required component	High	High	Phase 1: Source solar cabinets through the same DHIS2-approved supplier chain (confirmed operational in 76/80 counties). Require a 3-year maintenance	UNICEF Supply / MoGEI / NCA

	(see Section 3.0), but maintenance capacity is near-absent at county level.			agreement with the supplier as a condition of procurement. Train at least 2 county-level solar maintenance technicians per state during Phase 1 CPD rollout.	
Technical	Electronic waste (e-waste) accumulation from devices at end of life. South Sudan has no formal e-waste management infrastructure. Batteries and circuit boards disposed of in open-air dumps create environmental and child health hazards.	Medium	Medium	Incorporate an end-of-life device disposal clause in all procurement contracts, requiring suppliers to accept return of devices for recycling or responsible disposal. Align with the Cybercrime and Computer Misuse Act 2026 compliance requirements for responsible data destruction on retired devices. Include e-waste guidance in facilitator training materials.	DLCC / MoGEI / Supplier
Technical	Data security and child safety on shared devices. Shared tablet environments without content filtering expose learners to inappropriate content, particularly in community hub settings accessible to multiple age groups. The Cybercrime and Computer Misuse Act 2026 Section	High	High	All devices deployed in school or community settings must have child-safe content filtering enabled before distribution (Kolibri and RACHEL include built-in content curation; no external internet access removes the primary risk vector). Develop a Child Online Protection Protocol aligned with the Cybercrime Act 2026 and UNICEF's child safeguarding framework as a Phase 1 DLCC	DLCC / UNICEF CPHA / MoGEI

	42 creates platform liability for undesirable content.			output. Train all facilitators on safe device use protocols.	
Logistical	Device theft and asset loss. Concentrated digital assets (tablet sets, projectors, solar cabinets) in insecure school environments create high-value theft targets, particularly in conflict-affected states.	High	High	Engrave all devices with a government/UNICEF asset code and register in the EMIS asset management system. Store devices in lockable, solar-charged cabinets (the DHIS2 model). Require the school management committee (SMC) to sign a community asset agreement accepting responsibility for device security. Purchase asset insurance as part of Phase 2 procurement.	MoGEI EMIS / SMC / UNICEF
Logistical	Supply chain disruption for hardware and SD card distribution during flood season (July–October) and conflict-related access restrictions. Phase 1 distribution logistics may not align with the academic calendar.	High	Medium	Distribute all Phase 1 hardware and pre-loaded SD cards before June (pre-flood season) in Jonglei, Unity, Upper Nile and Warrap. Pre-position spare SD cards and power banks at County Education Centres (CECs) for distribution by county officers without requiring logistics support from Juba. Develop a conflict-contingency logistics protocol identifying alternative distribution routes for states with active OCHA-classified access constraints.	UNICEF Supply / MoGEI / OCHA

Logistical	Facilitator attrition and absenteeism. The Junub Academy Model 2 demonstrated that facilitation is the primary driver of learning gains, but facilitator continuity cannot be assumed given salary delay patterns documented across multiple KII sources.	High	High	Phase 1: Establish a facilitator incentive structure that does not depend on government salary channels (e.g., NGO-administered stipends, conditional on attendance tracking data). Phase 2: Train two facilitators per site to ensure coverage during absences. Incorporate facilitator attendance in the monthly CEC officer visit report.	MoGEI / UNICEF / Implementing Partners
Logistical	Content localization gaps in national languages. No current digital content in the programme inventory is available in Nuer, Dinka, Toposa or Bari for primary or ALP learners. Content produced only in English or Juba Arabic will not reach the majority of target learners.	High	High	Phase 1 DLCC mandate: commission 50 IRI-format audio lessons in five national languages (Bari, Dinka, Nuer, Zande, Toposa) for P1–P3 before any Phase 2 device deployment. Establish national language content production as a pre-condition for Phase 2 go/no-go decision. Require all content funded under GPE-TESS to specify the language of production in the reporting framework.	DLCC / MoGEI / NCDC / UNICEF
Social	Cyber-safety risks for children in community hub settings. Section 4.1.5 notes that the Cybercrime and Computer Misuse Act 2026 (Section	Medium	High	Restrict device use to facilitated sessions only (devices locked in solar cabinets when facilitator not present). Install Kolibri or RACHEL content-curation tools that block all external	DLCC / UNICEF / CPHA / MoGEI

	42) creates platform liability for undesirable content. Community hubs accessible outside school hours may expose children to unmonitored device use.			content by design. Include a child online safety module in facilitator training (minimum 2 hours) and in parent/community orientation sessions. Report any incidents of misuse to the DLCC Child Protection focal point.	
Social	Community resistance to girls' participation in digital learning sessions. In conservative communities, mixed-gender digital sessions in shared facilities may face community resistance, particularly in Unity and Warrap.	Medium	High	Conduct community engagement and sensitization sessions with parents, community leaders and religious leaders before any pilot site is operationalized. Establish separate session times or spaces for girls where community norms require it. Appoint female community champions (from the SMC or women's groups) as programme ambassadors. Gender equity targets and community engagement outcomes should be reported in the Phase 2 quarterly review.	MoGEI / Implementing Partners / Community
Social	Language and literacy barriers for facilitators accessing CPD content in English. An estimated 70% of primary teachers have no formal	High	High	All CPD materials for facilitators must be available in Juba Arabic and at least two national languages. Pictorial job aids (as used in DHIS2 deployment) must accompany all device	MoGEI / UNICEF / IRC

	training; a significant proportion are Juba Arabic or Dinka first-language speakers. CPD content in English only will not reach the majority of the target facilitator workforce.			operation instructions. Phase 1 facilitator training must include a language-accessibility review of all training materials before delivery.	
Social	Digital divides among teachers creating equity gaps in CPD access. Smartphone-dependent CPD channels (Junub Academy zero-rated, IRC vTLC) reach only the 33.5% of mobile subscribers who own smartphones, disproportionately excluding female teachers and rural postings.	High	Medium	Blended CPD architecture (as recommended in Section 5.2) ensures no single channel is the sole pathway. Radio CPD and cluster meetings serve as the backbone for the 66.5% on feature phones. Device subsidy for teachers prioritizes rural postings and female teachers. Gender-disaggregated CPD participation data reported quarterly to the DLCC.	MoGEI / UNICEF
Governance	Partner fragmentation through parallel digital systems. Partners continue to deploy separate content platforms, distinct training approaches, incompatible data systems and geographically	High	High	Make DLCC review a condition of new digital learning investment (Section 7.3). All partners adopt the common content quality standard, commit to EMIS-linked reporting and register pilot geographies in a DLCC coordination map to prevent overlap. Donors	DLCC / MoGEI / Development partners

	scattered pilots (Chapter 4 inventory), duplicating infrastructure and preventing system-level learning or MoGEI oversight.			(World Bank, USAID, FCDO, EU) align co-financing under the DLCC rather than funding standalone platforms. Annual DLCC stocktake reports partner alignment status to MoGEI senior management.	
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Table 3: Risk Mitigation Matrix. Sources: World Bank DE4A (2022); Cybercrime and Computer Misuse Act, Republic of South Sudan (2026); NCA Annual Report (2021); UNICEF Child Safeguarding Policy Framework (2023); IRC Inclusive Education in Emergencies Technical Brief (2023); Save the Children GPE-TESS Programme Documentation (2024); DHIS2 Technical Framework and MoH National Performance Report (2026); OCHA South Sudan Access Monitoring Report (2025).

The thirteen risks above are not independent. Electronic waste risk is downstream of procurement choices made in Phase 1. Cyber-safety risk is downstream of the content filtering and facilitation decisions in Phase 2 site design. Device theft risk is downstream of community engagement quality. Partner fragmentation risk compounds every other risk in the matrix, because parallel systems multiply the device fleets, facilitator cadres and data flows that each mitigation must cover. The DLCC Risk Register should treat these interdependencies explicitly, updating risk status and mitigation progress monthly in Year 1 and quarterly thereafter. Three risks are rated as Phase 1 prerequisites (device failure, child safety, facilitator attrition): Phase 2 implementation approval should be conditional on documented mitigation progress against all three.

12.1 Operational child safeguarding in digital learning settings

The risk matrix above treats child safety as a set of discrete mitigations. UNICEF programming requires more than this: an operational safeguarding layer that governs how children actually encounter devices, facilitators and digital content in community settings. This is particularly consequential for the County Digital Learning Hub model, which deliberately places digital infrastructure outside the school compound and serves ALP learners, adolescent girls and out-of-school children whose participation depends on community trust. The Cybercrime and Computer Misuse Act, 2026 establishes platform liability (Section 42) and cyber harassment provisions (Section 67) but does not create a child online protection framework, and South Sudan has no national Data Protection Act; programme-level safeguarding protocols must therefore carry the full operational weight, anchored in the UNICEF Child Safeguarding Policy Framework (2023) and MoGEI child protection referral pathways.

Hub-level safeguarding protocol. No hub or CEC digital session should operate before a written safeguarding protocol is adopted by the School Management Committee or equivalent community structure. The protocol covers: facilitator vetting and a signed code of conduct; a two-adult rule for all sessions involving children; protection from sexual exploitation and abuse (PSEA) orientation for every facilitator, with reporting channels displayed pictorially at the site for low-literacy users; and an incident reporting pathway that routes both offline incidents (physical safety, harassment at or en route to the hub) and online incidents (exposure to harmful content, contact risks) into the existing child protection case management system through the UNICEF Child Protection in Humanitarian Action (CPHA) referral mechanism, not a parallel education-sector channel.

Supervision of girls in mixed settings. Section 6.1 documents the gendered barriers to participation; the risk matrix records community resistance to mixed-gender sessions. The operational response is scheduling and staffing, not exhortation: hubs should offer girls-only session blocks where community consultation indicates demand, set an explicit target for female facilitator presence (at minimum one female facilitator or trained chaperone per mixed session), schedule sessions in daylight hours with attention to safe travel routes and report sex-disaggregated attendance to the DLCC monthly so that a collapse in girls' attendance is detected as a safeguarding signal, not discovered at evaluation.

Safe access for children with disabilities. Hub site selection should include a basic physical accessibility audit (entrance, seating, latrine access), and session protocols should provide for positioning of learners with visual or hearing impairments, activation of built-in accessibility features on Android devices (font scaling, screen readers, captioning where content supports it) and facilitator orientation on disability-inclusive session management, consistent with the disability-responsive design commitments in Section 6.7. Children with disabilities face elevated protection risks in group settings; facilitator training must address this directly rather than treating inclusion and safeguarding as separate modules.

Device and content misuse controls. Devices operate in facilitated sessions only and are locked in solar cabinets between sessions, as specified in the risk matrix. Beyond this: all content loaded onto hub devices is drawn from a DLCC-approved whitelist; child-safe filtering is enabled before distribution and verified at deployment; facilitators conduct periodic spot checks of device use during sessions; and a graduated response protocol distinguishes accidental exposure from deliberate misuse by adults, with the latter treated as a safeguarding incident subject to the reporting pathway above. Given the absence of a national data protection framework, programmes should collect no personal data from children beyond the minimum required for attendance and learning measurement, retain it only for the programme MEL cycle and never transfer learner-level data to third parties without DLCC-approved protocols.

13. Sustainability and ownership model: Handover and maintenance strategy

The most common failure mode in EdTech deployments in fragile states is not the technology. It is the handover: the moment when donor or NGO project management transfers to government

counterparts without a corresponding transfer of technical capacity, budget and institutional mandate. South Sudan's own programme history offers evidence of this pattern. Education on Air II built a content library of 361 audio lessons, but without an operational QA mechanism, 65 per cent of that library is rated low quality and continues to be distributed. The Junub Academy platform was built with government branding and MoU backing, but operational continuity depends on a single partner organization (Educare) rather than embedded MoGEI capacity. If GPE-TESS funding ends in 2028 and no institutional handover has occurred, both programmes revert to their current fragile state: assets in the system, no government capacity to maintain them.

The sustainability model proposed here operates across three dimensions: institutional ownership, technical maintenance and financial continuity. Each is addressed in turn, with specific actions assigned to Phase 1, Phase 2 and Phase 3 of the strategic roadmap.

13.1 Institutional ownership: The ministry as digital learning principal

The Digital Learning Coordination Committee (DLCC) is the institutional ownership mechanism, and its design reflects a deliberate choice about where authority sits. The DLCC is embedded in MoGEI's senior management structure reporting to Undersecretary level rather than housed in a project management unit that dissolves when funding ends. This matters because institutional memory in South Sudan's education system is severely constrained by staff turnover and displacement. A committee with a standing mandate, documented procedures and a physical secretariat (co-located with the ICT Unit) is more likely to survive staff changes than a project-housed governance structure.

Phase 1 institutional ownership actions are: (1) Formally gazette the DLCC with its five standing mandates within 90 days of this report's finalization; (2) Establish a digital asset register under the EMIS Unit, listing all devices, solar systems and content libraries procured under GPE-TESS; (3) Assign a named MoGEI digital learning officer (at minimum, Director level) as the institutional counterpart for UNICEF technical support; (4) Require that all digital learning programme designs submitted to the DLCC include an exit and handover strategy as a mandatory component of project documentation.

By Phase 2 (months 12–36), institutional ownership should have matured to the point where MoGEI can independently convene the DLCC, commission content quality reviews through the NCDC Technical Review Committee and report against the MEL framework without requiring UNICEF technical secretariat support for routine operations. UNICEF's Phase 2 role transitions from secretariat to adviser, and that transition should be documented in the Phase 2 work plan.

13.2 Technical maintenance: Community-based hardware stewardship

Hardware maintenance is the most practically challenging dimension of sustainability in low-infrastructure settings. Solar panels degrade over 5–10 years. Tablet batteries require replacement after 2–3 years of daily use. SD cards need content updates as the curriculum changes. Projector bulbs need replacement annually in high-use settings. None of these maintenance tasks require a university-trained ICT technician, but all require someone with time, basic training and access to replacement parts.

The community-based hardware stewardship model proposed here draws directly on the DHIS2 County Health Department (CHD) model and adapts it for education. Each County Digital Learning Hub (co-located with the CEC) designates a Digital Hub Steward: a CEC-trained officer responsible for monthly device health checks, first-level troubleshooting using a pictorial maintenance guide and escalation of hardware failures to the state-level education ICT officer. The steward is not an additional hire; this is a function added to the existing CEC officer role, compensated through a small monthly stipend (USD 15–25, consistent with the DHIS2 county officer stipend structure) rather than a new salary line.

The maintenance protocol follows three tiers. Tier 1 (CEC Steward, monthly): visual inspection of solar panels and battery indicators, device charging verification, content update from pre-loaded master SD card distributed by county officer, basic screen and port cleaning and incident logging in a paper-based device health register. Tier 2 (State ICT Officer, quarterly): device diagnostic using a standardized checklist, battery replacement for devices showing <70 per cent charge retention, solar panel cleaning and angle adjustment, content synchronization check and submission of the quarterly asset status report to MoGEI. Tier 3 (UNICEF/supplier, annually): full hardware audit, warranty claim processing, supplier-supported battery replacement and solar system efficiency assessment. Phase 1 action: develop the pictorial maintenance guide in Juba Arabic and three national languages before Phase 2 device distribution begins.

Community ownership of hardware is reinforced through the School Management Committee (SMC) asset agreement signed at site inception (see Risk Framework, Chapter 12). The SMC agreement creates local accountability for device security and creates a community stake in hardware survival that project-managed equipment typically lacks. Evidence from Kenya's TUSOME programme and DRC's IRC tablet deployments confirms that community-signed asset agreements reduce device loss and theft rates by 40–60 per cent compared to deployments without community agreements (IRC, 2023; RTI International & OPM-Cynosure, 2017).

13.3 Financial continuity: Beyond the GPE-TESS cycle

GPE-TESS Phase 2 funding is finite. The sustainability model must identify revenue streams and cost-reduction mechanisms that allow core digital learning infrastructure to operate after 2028 without full external financing. Four mechanisms are viable in South Sudan's context: USAF allocation, MNO social good contributions, cost reduction through open-source and government supply chains, and a structured public-private partnership (PPP) model.

USAF digital learning allocation: Once the USAF implementation mechanism is established (a Phase 1 prerequisite under Action 2 in Chapter 11.1), the USAF is the most viable domestic financing source for recurring digital learning costs. The USD 9M approved for the national fibre backbone provides a model for how USAF funds can be directed to infrastructure-specific purposes. Education connectivity subsidies, device battery replacement and SD card content updates are all eligible USAF expenditure categories under the AU Digital Education Strategy framework. The DLCC should formally request that MoICT designate digital learning as a priority category in the USAF implementation mandate during Phase 1, creating a legal claim on USAF resources before Phase 3 funding decisions are required.

MNO social good contributions: The MTN-MoGEI-Educare zero-rating MoU (signed 10 March 2026) establishes a precedent for MNO contributions to digital learning without cash transfers. This model can be extended in Phase 2 to include: (a) in-kind device donations for the teacher CPD device subsidy programme, negotiated as part of the MNO's Universal Service obligation under the National Communication Act (2012); (b) discounted bandwidth for county hub synchronization, where GSM connectivity is available; (c) MNO-funded SMS micro-learning campaigns for teacher CPD, extending the MTN Back-to-Learning model (which reached 4.5 million people, per the March 2026 KII) to a sustained weekly teacher CPD channel.

Cost reduction through open-source and government supply chains: The highest recurring cost in most EdTech programmes is content licensing. The DLCC content development pipeline should produce exclusively openly licensed content (Creative Commons Attribution licences) from the outset, ensuring that all GPE-TESS-funded content remains freely reproducible after the project cycle ends. Hardware procurement through the DHIS2 government supply chain already operational across 80 counties eliminates the import markup that private procurement incurs (currently estimated at 45 per cent above landed cost per the MTN KII). A formal co-procurement arrangement between MoGEI and MoH for Android tablets, solar cabinets and power banks, using the DHIS2 supplier framework, would reduce device unit costs by an estimated 20–30 per cent relative to standalone education procurement.

Underlying these mechanisms are three ownership-and-financing models, each with a different durability-versus-speed trade-off; the strategy depends on sequencing them rather than choosing one. A government-led model (MoGEI recurrent budget plus USAF, once an implementation agency exists) offers the strongest continuity and national ownership but moves slowly and remains exposed to the USAF institutional gap and fiscal constraint. An NGO- and donor-led model (GPE-TESS, UNICEF, Save the Children) deploys fastest and carries technical depth, but is the least durable: it is precisely the model whose 2028 funding cliff this chapter exists to address. A private-sector and PPP model (MNO zero-rating and device partnerships under the National Communication Act Universal Service obligation) is strong on connectivity and scale but narrow on pedagogy, equity and the hardest-to-reach learners, who are commercially unattractive. None is sufficient alone. The recommended path uses donor financing to build and prove the system in Phases 1 and 2, transfers recurrent financing to the government model through a USAF digital-learning allocation in Phase 3, and sustains private in-kind contributions for connectivity throughout, with the DLCC holding the blend together (National Communication Act, 2012; Educare Organisation, 2025; World Bank, 2022).

Public-private partnership in digital learning is not a recommendation this analysis introduces; it is an existing national commitment. Resolution 5 of the Statement of National Commitment issued at the Inaugural National Conference on ICT in Education (Juba, 10–11 September 2024), signed by the Minister of General Education and Instruction, the Deputy Minister of ICT and Postal Services, and the corresponding ministers from all ten states and the three administrative areas, commits the government to actively seek partnerships with telecom providers, technology companies, and development partners. This sits alongside the regulatory framework established under the National Communication Act, where the Universal Service obligation defines telecom operators' contribution to underserved areas. The arrangements that follow operationalise both: the political mandate of Resolution 5 and the regulatory mechanism

of Universal Service. Three architectures are relevant — governance, financing beyond USAF, and risk-sharing.

The private-sector and PPP model named above is currently described only by its outcome, zero-rating, device partnerships, not by the structure that would govern or de-risk it. Three gaps need closing before this model can be presented to government as more than an MoU pattern.

PPP governance model: The DLCC's private-sector seats (Figure 8) give MNOs a voice in education coordination; they are not a PPP investment structure. A PPP arrangement needs its own governance layer, sitting under NCA or MoICT's existing regulatory mandate rather than the DLCC's pedagogical one, with defined contract management authority, performance monitoring against MoU obligations (zero-rating thresholds, social good data tier targets), and an escalation path separate from DLCC business. The legal anchor already exists in the National Communication Act's Universal Service obligation; what's missing is the operating structure underneath it.

PPP financing options beyond USAF: USAF (Section 3.4) remains the primary domestic financing vehicle, but it is a Phase 3 mechanism contingent on an implementation agency that does not yet exist. Two further instruments warrant evaluation in Phase 2 design: blended finance, where donor first-loss capital de-risks MNO connectivity investment in counties where the commercial case alone won't justify build-out (Unity, Jonglei); and results-based financing, where private disbursement is tied to verified outcomes, EGRA/EGMA gains, county hub sync rates, rather than to installation milestones alone. Neither requires new legislation; both require the DLCC to specify them as acceptable instruments before negotiating Phase 2 MNO agreements.

PPP risk-sharing arrangements: Three risks are already named elsewhere in this analysis but never allocated. Demand risk, the commercial unattractiveness of the hardest-to-reach learners, falls on donor financing during Phases 1 and 2, the same logic that already governs the broader sequencing in this chapter. Delivery risk, technical and operational failure within an MNO's existing network footprint, sits with the MNO, consistent with the obligations already established in the MTN and Zain MoUs. Fiscal and regulatory risk, including the USAF implementation gap itself, remains with government; it cannot be transferred to a private partner who has no authority to fix it. Naming this allocation explicitly, rather than leaving it implicit in the financing sequence, is what turns the PPP model from a description into a structure the DLCC can actually manage.

13.4 Handover timeline and milestones

Phase	Period	Ownership Milestone	Technical Milestone	Financial Milestone
Phase 1	Months 0–12	DLCC gazetted; digital learning officer named at director level;	Pictorial maintenance guide developed; 2 solar technicians	USAF digital learning priority designation requested; MNO Phase 2 in-kind agreement

		asset register established in EMIS	trained per state; RACHEL-Pi units tested in Unity and Jonglei	scoped
Phase 2	Months 12–36	MoGEI independently convenes DLCC; exit and handover strategies in all pilot TORs; SMC asset agreements signed at all sites	Hub Steward tier operational in all pilot counties; quarterly Tier 2 audits by State ICT Officers; first annual hardware audit completed	USAF co-financing arrangement for battery replacement formalized; MNO device donation agreement signed; open-source content library established
Phase 3	Months 36+	Full transfer of DLCC secretariat to MoGEI ICT Unit; UNICEF in advisory role only; MoGEI reports independently to GPE Results Framework	Community-based maintenance operating without external technical support; Tier 3 (supplier) annual audits continuing under warranty agreements	Digital learning included in MoGEI annual budget line; USAF digital education allocation active; MNO zero-rating and SMS CPD sustained

Table 4: Handover and Sustainability Milestones by Phase. Sources: DHIS2 Technical Framework and MoH National Performance Report (2026); MTN KII (March 2026); NCA Annual Report (2021); IRC, Community-Based Technology Stewardship in Fragile States (2023); RTI International, TUSOME Endline Evaluation (2022); World Bank DE4A (2022); National Communication Act, Republic of South Sudan (2012).

Financial sustainability is ultimately a political decision: it requires MoGEI and MoF to allocate a domestic budget line to digital learning before the GPE-TESS cycle ends. The history of externally funded EdTech in fragile states suggests that this rarely happens without deliberate advocacy, early budget insertion and a domestic champion at Director or Undersecretary level who can navigate the budget process. The digital learning officer role recommended in Phase 1 is designed precisely to create that domestic champion before the external funding ends.

Annex A: Data gaps register

DATA GAP TRACKER PHASE 2 PLANNING CONSTRAINTS

This tracker flags the three data gaps that directly constrain Phase 2 investment decisions. They must be resolved, or formally accepted with documented risk, before procurement is approved. Each gap is rated by Severity (CRITICAL / HIGH / MEDIUM) and Resolution Status. This tracker is a living document and should be updated at each DLCC quarterly meeting.

GAP 4 CRITICAL / UNRESOLVED ALP Learning Outcomes

Status: UNRESOLVED. Severity: CRITICAL. 189,000+ learners are enrolled in the Alternative Learning Programme. Zero outcome data exist from any ALP digital pilot site. No programme currently measures whether digital content improves foundational literacy or numeracy for this population. Blocking condition: All Phase 2 ALP digital procurement is blocked until a commissioned EGRA/EGMA baseline is completed through MoGEI and OPM, using randomized student selection and a control group. Teacher-selected sampling is prohibited, based on GPEP endline evidence of inflated baselines. Owner: MoGEI ALP Unit + OPM (commissioned). UNICEF MEL oversight. Resolution deadline: Month 3 of Phase 1 (before any ALP procurement TOR is issued).

GAP 5 HIGH / UNRESOLVED Unit Cost Data (South Sudan-Specific)

Status: UNRESOLVED. Severity: HIGH. All unit costs in this report are planning proxies from comparable fragile contexts. The variance range is 3 to 5 times across modalities: radio at USD 1 to 5 per child per year, facilitated tablet at USD 15 to 40, VSAT hub at USD 50 to 150. South Sudan's cost environment differs significantly from proxy sources due to road density (the lowest in Africa), import costs (45 per cent landed cost premium from import tax and type-approval fees) and conflict-driven logistics surcharges. Note: Proxy costs from comparable contexts are used throughout this report. South Sudan-specific unit costs must be confirmed before Phase 2 investment allocation is finalized. Using unvalidated proxies risks under-allocation (programme collapse) or over-allocation (inefficiency). Owner: UNICEF + MoGEI, to commission a cost study in Phase 1 Months 3 to 6. Estimated study cost: USD 20,000 to 30,000.

GAP 8 HIGH / UNRESOLVED WPDl Satellite Site Data

Status: UNRESOLVED. Severity: HIGH. Flag for Phase 2 confirmation. WPDl operates satellite-connected community learning centres using Intelsat Very Small Aperture Terminal (VSAT) connectivity and the Kolibri offline learning management system (LMS). The exact site count, geographic distribution, usage statistics, per-site Intelsat connectivity costs and learning outcomes are not available in any published WPDl documentation reviewed during desk research. This gap is the reason satellite community hubs remain classified as Tier 3 Conditional in the modality matrix. The cost structure of VSAT connectivity (typically USD 50 to 150 per site per month in comparable contexts) makes it the most expensive Tier 3 option. Without WPDl's actual South Sudan cost data, no investment case for VSAT expansion can be built. Required action before Phase 2: UNICEF to formally request WPDl operational data as a condition of Phase 2 satellite hub consideration. If data are not provided by Month 6, satellite hubs are excluded from Phase 2 planning. Owner: UNICEF Education + WPDl. Resolution deadline: Month 6 of Phase 1.

Ten data gaps were identified in Phase 1. None were fully closed by KII evidence. Six achieved partial resolution (Gaps 1, 2, 3, 6, 7, 9). Gap 9 (teacher digital skills baseline) was upgraded from UNRESOLVED to PARTIAL following integration of Digital 2026 proxy data: national adult digital literacy is significantly below the 34.5 per cent adult literacy rate, and 27.8 per cent of internet non-adopters nationally cite skills barriers as the primary reason for non-adoption (DataReportal, 2026). A population-level teacher-specific baseline remains absent and must be commissioned as a Phase 1 priority. Three remain unresolved (Gaps 4, 5, 8). One (Gap 10) was partially addressed through quality data rather than cost data. The full KII Synthesis Matrix (five-sheet workbook) is submitted as part of the Data Package.

Gap 1: State-level MNO population coverage % PARTIAL. NCA confirmed RAN site counts (MTN: 394/350/165; Zain: 265/121/73; Digitel: 40/40/40). Population coverage % by state unavailable at investment-grade resolution. The World Bank DE4A provides Table 8 (Mobile population coverage across states) as the best available proxy.

Gap 2: USAF budget and education eligibility PARTIAL. USD 9M approved June 2025 for fibre backbone design. Education confirmed as eligible category. No implementation agency.

Gap 3: EMIS 2024–25 update PARTIAL. 85 per cent school coverage target for 2024 (EMIS Unit, MoGEI, personal communication, March 2026). Device and electricity indicators added to census tool. MICS 2025 not yet integrated.

Gap 4: ALP digital pilot learning outcomes UNRESOLVED. CRITICAL. Zero outcome data from any ALP digital site. 189,000+ learners affected.

Gap 5: South Sudan-specific unit costs UNRESOLVED. Planning proxies from comparable contexts used throughout. 3–5x variance range.

Gap 6: Smartphone vs. feature phone by state PARTIAL. National split confirmed: 691,000 smartphones (33.5 per cent) vs. 1,371,000 feature/basic phones (66.5 per cent) among MTN subscribers. Only 588,000 smartphones are active data users. State-level disaggregation unavailable.

Gap 7: Content QA checklist PARTIAL. 72/361 lessons properly sequenced. 65 per cent rated low quality. MoGEI Curriculum Division willing to co-develop checklist; not yet operationalized.

Gap 8: WPDI satellite site data UNRESOLVED. Operational data (site counts, usage statistics, per-site costs, learning outcomes) not available in any published WPDI documentation reviewed.

Gap 9: Teacher digital skills baseline PARTIAL. No population-level quantitative baseline of teacher digital skills exists and none has been commissioned. However, the Digital 2026 Report (DataReportal, 2026) provides proxy indicators that partially bound the scale of the deficit: national adult digital literacy is significantly below the 34.5 per cent adult literacy rate, and 27.8 per cent of internet non-adopters cite skill barriers as the primary reason for non-adoption. Applied to a teaching workforce that is 70 per cent untrained and 40 per cent voluntary, these figures establish a credible floor estimate for the digital skills deficit without resolving the skill distribution question. UNESCO confirmed willingness and capacity to co-lead a formal baseline assessment (UNESCO South Sudan, 2022; personal communication, March 2026). Estimated cost: USD 40,000–70,000. Timeline: commission within 90 days of DLCC establishment. Lead: MoGEI ICT Unit and UNESCO South Sudan. Instrument: contextualized UNESCO ICT-CFT Level 1 rubric, tablet-administered, with pictorial and audio elements appropriate for a workforce with a 35 per cent adult literacy rate context. Population-level baseline required before Phase 2 CPD investment allocation is finalized.

Gap 10: Audio content production unit costs PARTIAL. No cost data obtained. Content quality data obtained instead (65 per cent low quality finding).

Annex B: Early grade MEL package

Six indicators form the minimum MEL package for any Phase 2 digital learning investment. They are calibrated to the data gaps identified in this analysis, the MEL design lessons from GPEP and EGRA/EGMA evaluations (Montrose International, 2016; Cambridge Education, 2018) and the EMIS 2.0 transition.

Indicator 1: % of digital learning pilot learners achieving Grade 3 EGRA threshold (50 per cent correct). Measurement: EGRA oral standardized assessment. Disaggregation: per pilot site, gender disaggregated. Frequency: baseline before launch; 6-month and 12-month follow-up. Rationale: establish whether digital modality produces measurable foundational literacy gains above control group.

Indicator 2: % achieving Grade 3 EGMA threshold (79 per cent correct). Same instrument, disaggregation and frequency. Numeracy gains tend to be stronger than literacy gains (GESP 2023–2027 baseline: 69.0 per cent EGMA vs. 39.1 per cent EGRA); disaggregation allows targeting.

Indicator 3: Facilitator attendance rate at digital learning sessions (% of scheduled sessions with trained facilitator present). Measurement: paper register (digitized to EMIS tablet).

Disaggregation: per site, monthly. Frequency: monthly, reported to CED quarterly. Rationale: facilitator attendance is the primary operational variable for learning outcome prediction (DRC, Somalia, Junub Academy evidence).

Indicator 4: % of content passing MoGEI NCDC content QA checklist. Measurement: Technical Review Committee review. Disaggregation: per lesson/content batch. Frequency: before any distribution. Rationale: prevents low-quality content distribution; activates existing MoGEI policy mandate.

Indicator 5: Number of teachers with measured baseline digital skills score (UNESCO, 2018). Measurement: tablet-based skills assessment (Tangerine or equivalent). Disaggregation: national, state-disaggregated, gender-disaggregated. Frequency: baseline Year 1; follow-up Year 3. Rationale: provides currently absent data for CPD channel investment decisions.

Indicator 6: % of county digital learning hubs operational (reporting at least one data sync per month to CED). Measurement: EMIS 2.0 hub reporting dashboard. Disaggregation: per county. Frequency: monthly. Rationale: operational continuity metric analogous to DHIS2 completeness rate.

MEL Design Requirements: Randomized student selection at all EGRA/EGMA assessment points is mandatory. Teacher-selected sampling is prohibited, based on GPEP endline evidence of inflated baselines (Cambridge Education, 2018). Control group design at all pilot sites is required for attribution. Facilitator attendance tracking must be linked to payment compliance per the MoGEI National General Education Policy mandate. All MEL data to be presented at DLCC quarterly meetings.

Annex C: KII sampling framework and completion status

The evidence collection combined seven primary Key Informant Interviews with seven secondary desk research reviews, conducted between February and May 2026. The scope followed a structured gap analysis against the ToR's six dimensions after Phase 1 desk review completion.

Primary KII respondents (7 interviews): MoICT (ICT Policy Directorate, MoICT, personal communication, March 2026), MoGEI ALP (ALP Unit, MoGEI, personal communication, March 2026), MoGEI EMIS (EMIS Unit, MoGEI, personal communication, March 2026), MoGEI Teacher Management (Teacher Management Directorate, MoGEI, personal communication, March 2026), MoGEI Curriculum Division (Curriculum Division, MoGEI, personal communication, March 2026), MTN South Sudan (MTN South Sudan, personal communication, March 2026), Zain South Sudan (Zain South Sudan, personal communication, March 2026). Secondary desk research sources (7 organizations): NCA (DR-01: Annual Report / Spectrum Audit), RTI International & OPM-Cynosure (DR-02: EGRA-EGMA National Baseline Data), UNESCO (DR-03: Education Sector Review), Save the Children (DR-04: GPE-TESS Programme Documents), WPDI (DR-05: published materials; operational data unavailable), MoH/DHIS2 (DR-06: DHIS2 Technical Framework / National Performance Report), IRC/NRC (DR-07: ApreDIA and vTLC programme documentation).

53 questions were administered across the seven primary KIIs. The KII Synthesis Matrix (five-sheet workbook) is submitted as part of the Data Package: Sheet 1 (Findings Matrix), Sheet 2 (Six Dimensions Cross-Analysis), Sheet 3 (Programme Inventory Tracker), Sheet 4 (Contradiction Register, 6 contradictions documented), Sheet 5 (Key Statistics, 49 verified data points with citation formats).

Resolution status: None fully closed. 6 PARTIAL (Gaps 1, 2, 3, 6, 7, 9). Gap 9 upgraded from UNRESOLVED to PARTIAL following integration of Digital 2026 proxy indicators (DataReportal, 2026): national adult digital literacy below 34.5 per cent adult literacy rate; 27.8 per cent of non-adopters cite skill barriers. Population-level teacher baseline remains absent. 3 UNRESOLVED (Gaps 4, 5, 8). 1 additional gap (Gap 10) partially addressed through quality data rather than cost data.

Annex D: References

References

Note on Primary Sources: All Key Informant Interviews (KIIs) conducted between February and May 2026 are classified as personal communications under APA 7 and are cited in-text only. They are not included in this reference list unless transcripts are formally archived. KII respondents are identified in Annex C.

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Annex E: Theory of change

Programme Theory of Change: Technology-Facilitated Learning in South Sudan

South Sudan Digital Learning Landscape Analysis, GPE-TESS Programme, 2026–2030

Problem Statement

South Sudan's education system faces a compounded learning crisis: 59 per cent of school-age children are out of school; enrolled Grade 3 learners score 39.1 per cent correct on EGRA; 70 per cent of primary teachers have no formal training; electricity reaches 7.2 per cent of the population nationally and 2 per cent of schools. Technology-Facilitated Learning (TFL) in this context must be assessed as a practical delivery option within these constraints, not as a standalone initiative that assumes connectivity, devices or stable electricity.

Inputs

- GPE-TESS programme funding (2024–2028, USD ~27M total)
- UNICEF technical oversight and MEL authority
- MoGEI institutional mandate and government ownership
- MNO zero-rating agreements (MTN MoU confirmed March 2026, Zain in principle)
- DHIS2 co-financing at county level (Ministry of Health partnership)
- UNESCO teacher baseline assessment capacity
- Implementing partner operational presence (Save the Children, IRC, NRC, WPDI)

Activities

- Establish Digital Learning Coordination Committee (DLCC) within 90 days of report finalization (Phase 1)
- Commission teacher digital skills baseline with UNESCO (Phase 1)
- Conduct content quality review of 361 radio/USB lessons (Phase 1)
- Commission EGRA/EGMA MEL framework for all Phase 2 sites (Phase 1)
- Operationalize MTN and Zain zero-rating MoUs (Phase 1)
- Commission South Sudan-specific unit cost study (Phase 1)
- Pilot three County Digital Learning Hubs (Phase 2)
- Launch zero-rated Unstructured Supplementary Service Data (USSD) learning pilot, Central Equatoria (Phase 2)
- Commission ALP EGRA/EGMA baseline and pilot with control group (Phase 2)
- Extend Junub Academy to Alternative Learning Programme (ALP) level in national languages (Phase 2)
- Pilot County Education Centre (CEC) digital CPD programme in three states (Phase 2)
- Distribute 5,000 USB sticks with QA-cleared content only (Phase 2)

Outputs

- DLCC operational and meeting at scheduled frequency
- 361 radio/USB lessons reviewed; 72 cleared for redistribution; 50 new IRI-format lessons commissioned
- Teacher digital skills baseline completed, gender-disaggregated, by state
- EGRA/EGMA baseline data available for all Phase 2 pilot sites before procurement
- Three county hubs operational, reporting monthly data sync ≥ 80 per cent
- USSD pilot usage data available for Phase 3 scale decision
- ALP pilot pre-test/post-test data with control group
- CEC CPD mentoring data from three states

Outcomes (Months 12–36)

- Governance mechanism for digital learning coordination is institutionalized within MoGEI
- Content quality risk is reduced: only QA-cleared content is distributed at scale
- CPD investment is targeted based on measured teacher skill distribution rather than assumed baseline

- Evidence base exists to determine which modalities produce learning gains for primary and ALP learners under South Sudan's infrastructure conditions
- MNO partnerships formalized, providing zero-rated access for the 588,000+ active data subscribers

Impact (Months 36+, conditioned on Phase 2 evidence)

- Measurable improvement in EGRA/EGMA scores for learners in digital pilot sites compared to control groups
- Structurally excluded learner groups (girls, IDP children, ALP learners, children with disabilities, nomadic children) reached by modalities designed against their actual infrastructure conditions
- government financing through USAF education allocation, reducing aid dependency for digital learning investment
- Digital learning governance embedded in MoGEI institutional architecture, surviving the GPE-TESS funding cycle end in 2028

Key Assumptions

- DLCC establishment receives MoGEI political commitment within 30 days of report finalization
- GPE-TESS Phase 2 budget allocation includes a dedicated digital learning line of USD 610,000–1,000,000
- Ministry of Health DHIS2 team agrees to co-location and co-financing arrangements at county level
- MICS 2025 data become available before Phase 2 scale-up decisions are finalized
- Content quality review is funded within existing UNICEF programme budget

Key Risks (*see Chapter 10 for full analysis*)

- ALP learning outcomes gap (CRITICAL) blocks Phase 2 ALP procurement without baseline
- Teacher digital skills baseline absent (HIGH) misaligns CPD investment
- South Sudan-specific unit costs unknown (HIGH) creates Phase 2 budget uncertainty
- USAF no implementation agency (HIGH) blocks Phase 3 government financing pathway
- Content quality gap (HIGH, ACTIVE) low-quality content currently being distributed

for every child

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