Learn

ICT for Rural Education Development

eTextbook pilot in Nciba Circuit Schools

Technology for Rural Education Development (Tech4RED)

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Department:
Basic Education
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Tech4RED Large Scale Demonstrator

Purpose

To demonstrate how **technology research, development and innovation** can support the transformation of the **Education system**, in the particular **context and realities of rural South Africa**.

The aim is to **build on existing, new and future technology research, development and innovation initiatives** in various disciplines amongst multi-disciplinary partners, that can be **integrated and packaged** to support the Cofimvaba rural education district in South Africa in a **systemic way**

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Tech4RED

Key objective

To create a platform to enable widespread participation and collaboration between multiple stakeholders (private, public, academic, civil society, community) to implement a large **Technology for Education Demonstrator in the Cofimvaba rural school district** that has the **buy-in of key stakeholders** and has **demonstrable impact** on education and quality of life in the region

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Tech4RED

Focus Areas

- Health and Nutrition
- Transport and Logistics
- Building technologies
- Water & Sanitation
- Renewable energy
- Science and Technology Centre
- **ICT for Rural Education Development (ICT4RED)**

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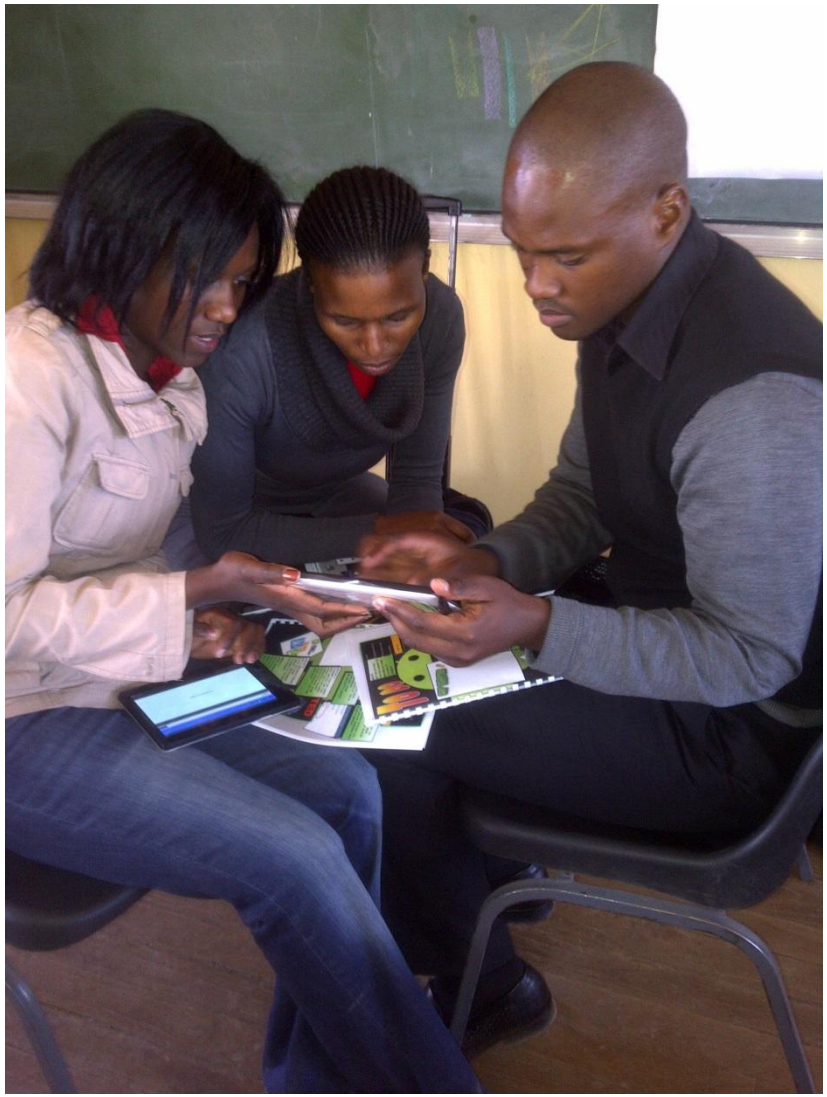
Overview of current ICT4RED activities



- ✓ **2012:** Rollout of Dr Math and other MXit-based Maths and Science options to all Cofimvaba schools
- ✓ **2012/13:** ICT4RED mobile learning pilot at Arthur Mfebe Senior Secondary School
- ✓ **2012:** eTextbook Investigation
- ✓ **2012/13/14:** Identify & rollout "Quick Win" ICT interventions
- ✓ **2013:** Large eTextbook Pilot

Cofimvaba eTextbook Priority Focus

AIM: 21st Century Schooling

SUPPORT FOR ACCESS TO DIGITAL CONTENT

Support for a 21st Century School Environment

ICT to support teaching and Learning

Support for informed and "smart" ICT decision-making

LEARNERS AND HOME

TEACHERS AND SCHOOL

GOVERNMENT AND POLICY

Improved EDUCATIONAL OUTCOMES

- Learner Achievement
- 21st Century Skills & Competencies
- Employability Skills & Competencies

"Basic Enablers" - Creating the required pre-conditions for learning

FUNCTIONAL SCHOOL ENVIRONMENT

Competent Management & Leadership

Competent Educators

Informed parents

ADEQUATE INFRASTRUCTURE

Buildings
Sanitation
Electricity
Water

Access to ICTs

NON-ACADEMIC LEARNER SUPPORT

Health
Nutrition
Transportation
Socio-economic

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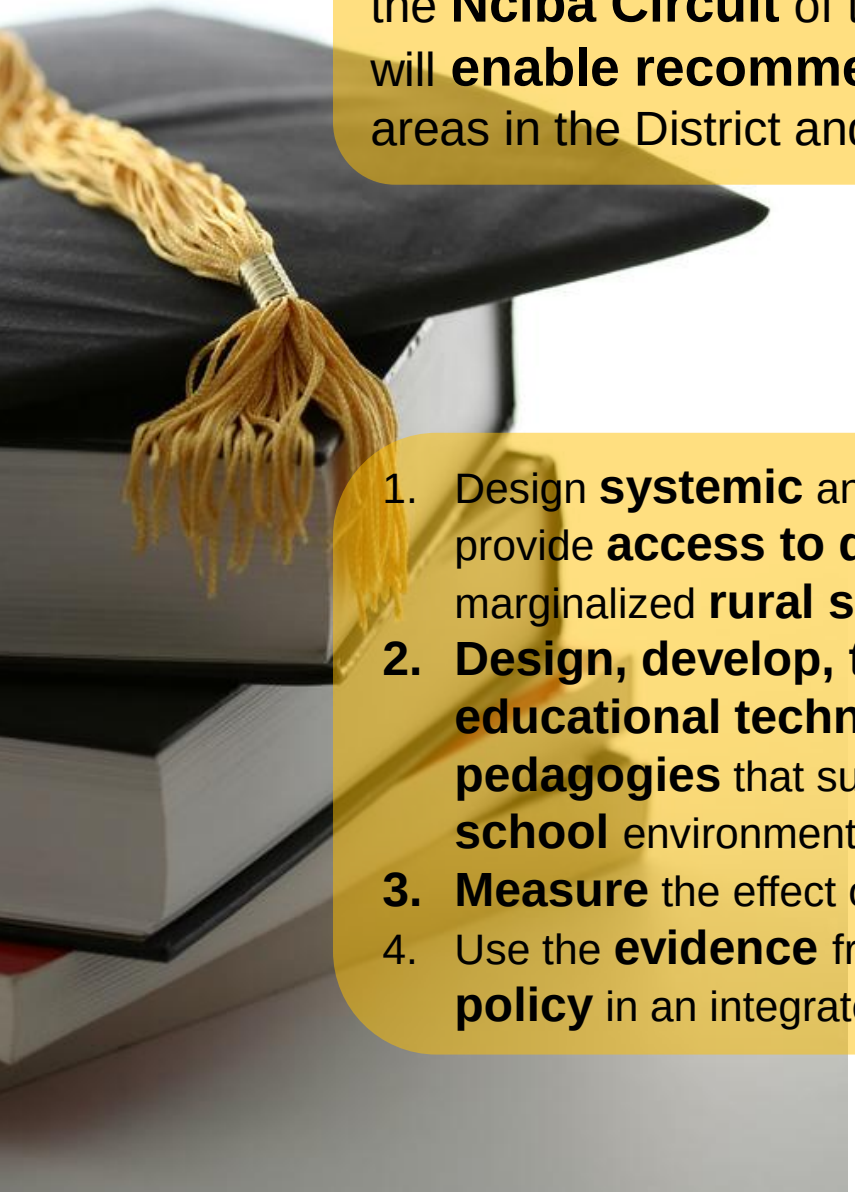
Aim

To investigate the viability of providing **electronic textbooks** and other **educational digital content resources** to 25 schools in the **Nciba Circuit** of the Cofimvaba School District. This learning will **enable recommendations** towards **scaling** these to other areas in the District and ultimately nationally.



Objectives

1. Design **systemic** and **sustainable approaches** and **models** to provide **access to digital content** by **learners** at poor and marginalized **rural schools** in South Africa;
2. **Design, develop, test** and **improve new** and **evolving educational technologies**, **mobile devices**, **platforms** and **pedagogies** that support the **use of digital content** for **rural school** environments;
3. **Measure** the effect on the **21st skills of learners**; and
4. Use the **evidence** from the research within this context to **inform policy** in an integrated and coherent manner.

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Project Scope

- Focus on 26 Nciba schools, 6 500 learners
- Test various models, in terms of
  - ✓ Devices (tablets)
  - ✓ Content
  - ✓ Infrastructure
  - ✓ Connectivity
  - ✓ Integration into the school
  - ✓ Costs (TCOs)
  - ✓ Sustainability
  - ✓ Logistics
  - ✓ Support & Maintenance
  - ✓ Operations
  - ✓ Change Management
  - ✓ Teacher training

- In parallel with existing paper-based textbooks
- CSIR Meraka will have overall project Management responsibility

NOW

Learning and Teaching Support Material consisting of paper-based textbooks, workbooks & readers

LEARNERS & HOME

TEACHERS & SCHOOL

GOVERNMENT & POLICY

?

21st Century Schooling

Learning and Teaching Support Material consisting of interactive multimedia learning resources

Project Management

CONTENT
Standards
Conversion
Creation & Customisation

TECHNOLOGY
Devices
Infrastructure
Connectivity

PEDAGOGY
Training
Preparation
In the classroom

CHANGE MANAGEMENT
People (District, SMT)
Technology
Process

OPERATIONS MANAGEMENT
Logistics
Support & Maintenance
Distribution

RESEARCH
Masters & PhD
Technology R&D
ICT4E R&D

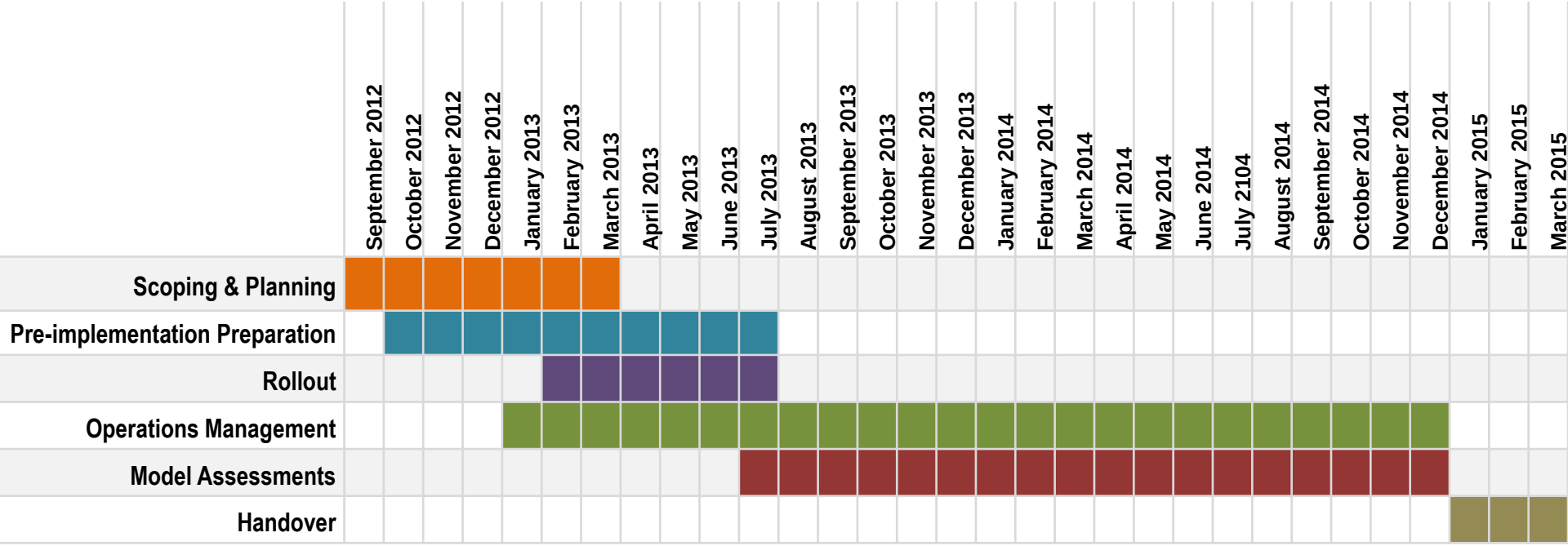
Monitoring & Evaluation

Principles


Open Standards
Pragmatism
Inclusivity
Transparency
Local suppliers
Develop local capacity
Sustainability
Minimal school disruption

Phases – over 33 months

- **PHASE 1:** Scoping and Planning (August 2012 - March 2013)
- **PHASE 2:** Pre-implementation preparation (October 2012 - July 2013)
- **PHASE 3:** Rollout (February 2013 - July 2013)
- **PHASE 4:** Operational Management (January 2013 - December 2014)
- **PHASE 5:** Model assessments (July 2013 - December 2014)
- **PHASE 6:** Handover (January 2015 - March 2015)



Key Decisions

Enable CHOICE in terms of hardware, software and content, by supporting open standards as much as possible.

Why **Android tablets** and not **iPad** or **dedicated eReaders?**

- ✓ Affordable long-term **total cost of ownership** (TCO) in terms of repairs, replacement parts, cost of hardware, cost of accessories, etc;
- ✓ Availability of off-the-shelf, child-friendly, **ruggedised devices**;
- ✓ Since it is open source, it enables a **high level of customisation** (e.g. preloading educational apps, device tracking, customised software, version control, custom configuration of devices per phase/learner/teacher, etc);
- ✓ Support for **open standards** (e.g. ePub);
- ✓ Options to create a **South African Educational AppStore**, without having to go via a proprietary appstore;
- ✓ Ability to **side-load content and apps** (e.g. via an SD card);
- ✓ Support for **removable/expandable storage** which is critical for content dissemination in low/no connectivity environments;
- ✓ Ability to **tightly control specifications of devices** in order to save costs;
- ✓ Possibility of **lock-in is minimal**.

	Power - friendly	Affordability	Ruggedness	Form Factor	Colour	Read in bright light	Read in dark	Interactivity	Multimedia	Wifi	3G	Other wireless	Removable storage	Standards support	Proprietary Bookstore	Lock-in Possibility	Future Proof	
Dedicated eReaders																		
Kindle/other																		Proprietary (links to bookstores)
New device																		Launch imminent, TFT
LCD eReaders																		
Wyzeman																		Proprietary platform
Feature Phones																		
Most brands																		MXit?, data cost, distraction
Smartphones																		
Vodafone 858 (Android)																		Distraction/acceptability factors
High end Android																		Cost
iPhone																		Cost + lock-in
Tablets																		
Google Nexus 7 (Android)																		Storage via cloud, no SD card
Kindle Fire (Android)																		New model awaited
Intel StudyBook (Android)																		Waiting for availability
Chinese Custom (Android)																		Quality improving
High end Android																		Cost
iPad																		Cost + lock-in

Key Decisions

Design the infrastructure at the school to be as self-sustaining as possible, with regard to power, device storage and safety, content provision and network connectivity.

Safe storage and charging facilities at each school – shared and in-classroom solutions

- ✓ Lockers
- ✓ Battery and solar backup
- ✓ Combination of off-the-shelf and custom

Local Wifi Network per school

- ✓ Off-the-shelf solutions

Local Content server per school

- ✓ MobiHub Meraka solution
- ✓ Secure storage
- ✓ Digital Doorway content
- ✓ Sentech educational content portal
- ✓ Local digital library solution (readers, books)
- ✓ Appropriate mobile educational apps and content to be sourced

Other infrastructure as appropriate

- ✓ Telkom library system
- ✓ Projector

Key Decisions

Focus on Maths, Science and supporting skills, such as numeracy, literacy and English as a first additional language (EFAL). Where additional content is available and can be easily sourced, it will also be made available.

ALL

- ✓ Ruggedised tablets
- ✓ 3 Lesson plans per term developed for educators
- ✓ Digital “edupack” for educators
- ✓ Content server per school (“Local educational intranet”)

Foundation Phase (Gr R – 3)

- ✓ Shared tablets in the classroom
- ✓ Numeracy, Literacy, EFAL - DBE workbooks, 1 per grade
- ✓ Preload multimedia content in a “Sandbox”

Intermediate Phase (Gr 4 – 6)

- ✓ Shared tablets in the classroom
- ✓ Mathematics, Science, EFAL - DBE workbooks, 1 per grade
- ✓ Preload multimedia content in a “Sandbox”

Senior Phase (Gr 7 – 9)

- ✓ 1 tablet per learner (to use at home too)
- ✓ Mathematics, Science, EFAL - DBE workbooks, 1 per grade
- ✓ Preloaded multimedia content on tablet

Gr 10 - 12

- ✓ 1 tablet per learner (to use at home too)
- ✓ Mathematics, Science, EFAL
- ✓ DBE workbooks, 1 per grade and Siyavula textbooks
- ✓ Preloaded multimedia content on tablet

Key Decisions

Important to focus on underlying "soft skills", such as leadership and management, in both the district and the schools. Focus is on preparing District officials and school management team (SMT).

Community buy-in

- ✓ SGB
- ✓ Parents
- ✓ Local authorities
- ✓ Tribal authorities

District and Province

- ✓ Change Management training

School Management Team

- ✓ Management and leadership skills development
- ✓ ICT Change Management

Educators

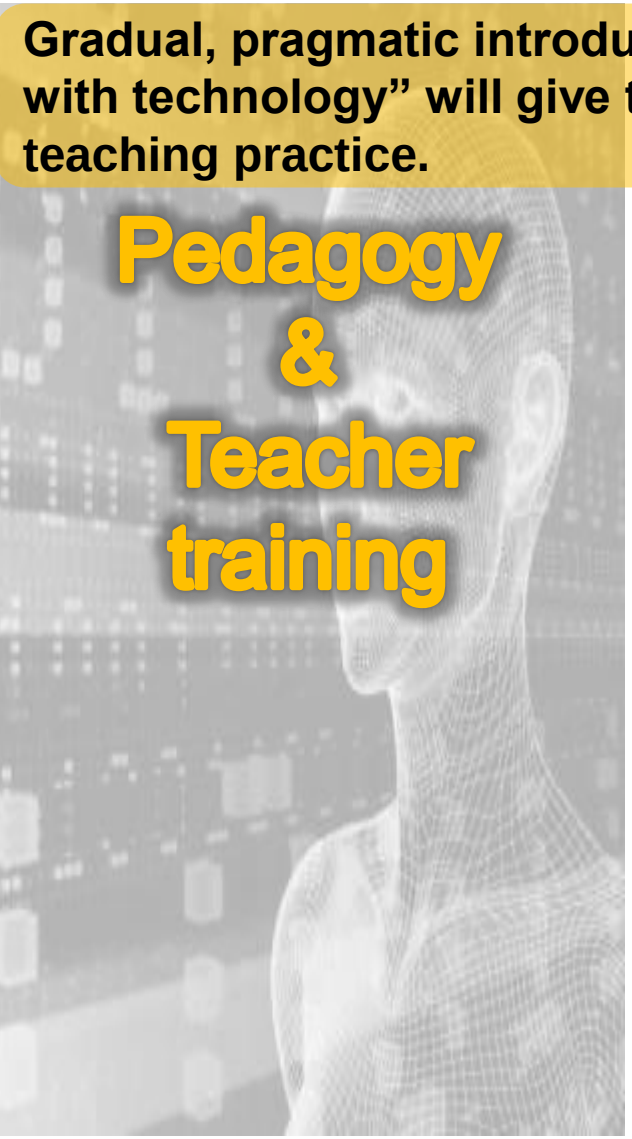
- ✓ ICT Change Management
- ✓ Digital literacy
- ✓ Digital responsibility and footprints

Learners

- ✓ Digital literacy
- ✓ Digital responsibility and footprints

Key Decisions

Gradual, pragmatic introduction of educators to the technology and "teaching with technology" will give them time to integrate the technology into their teaching practice.



Digital educator "edupack"

- ✓ Lesson plans
- ✓ CAPS documents
- ✓ Supporting information
- ✓ Good practice examples

Teacher pedagogical support person per school

- ✓ Focus on "how to teach with the technology"
- ✓ Link with Sasol initiative?

Training courses

- ✓ Close links with change management
- ✓ 10 - 12 courses
- ✓ After hours (afternoons)
- ✓ Short (3 hours)
- ✓ Different training content according to school phases (Foundations vs Intermediate vs Senior)

Key Decisions

Tiered approach – local, on-site support and centralised escalation options.

Rollout

Implementation teams

- ✓ Wifi network + other infrastructure
- ✓ One school per week

Operational Management

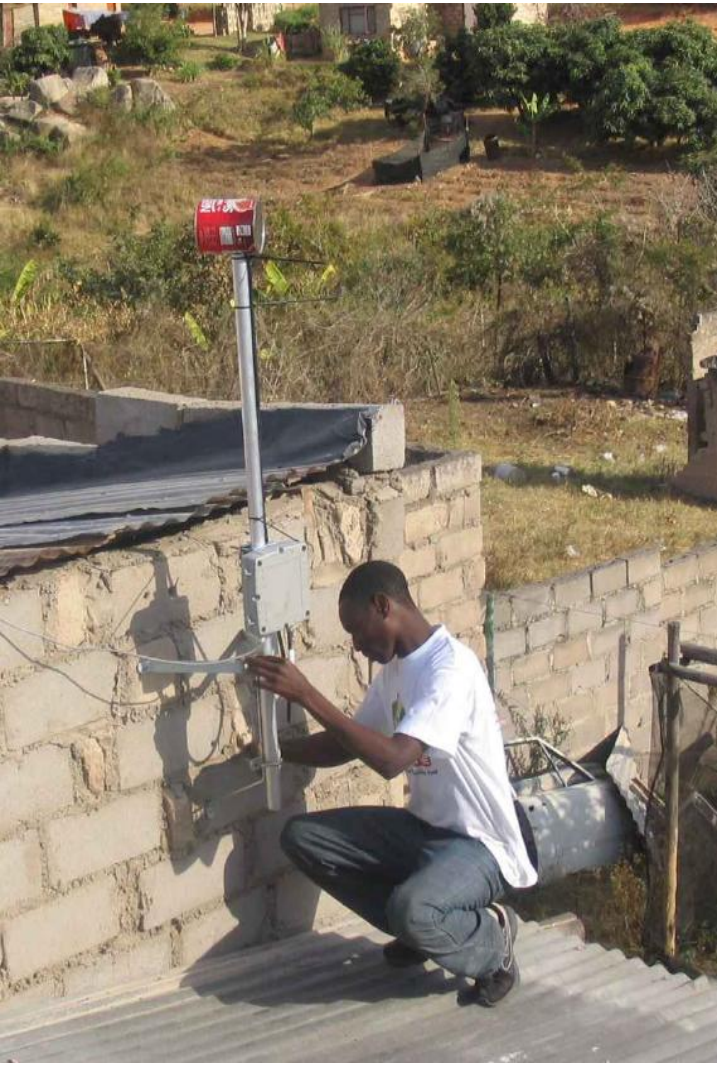
Local on-site technical support per school

- ✓ Train young, unemployed youth from the community
- ✓ Local manager in Cofimvaba
- ✓ Central Help Desk
- ✓ Escalation to experts

Operations

- ✓ CSIR Meraka to incubate
- ✓ Link to existing operational environment for BB4All
- ✓ Handover NB!

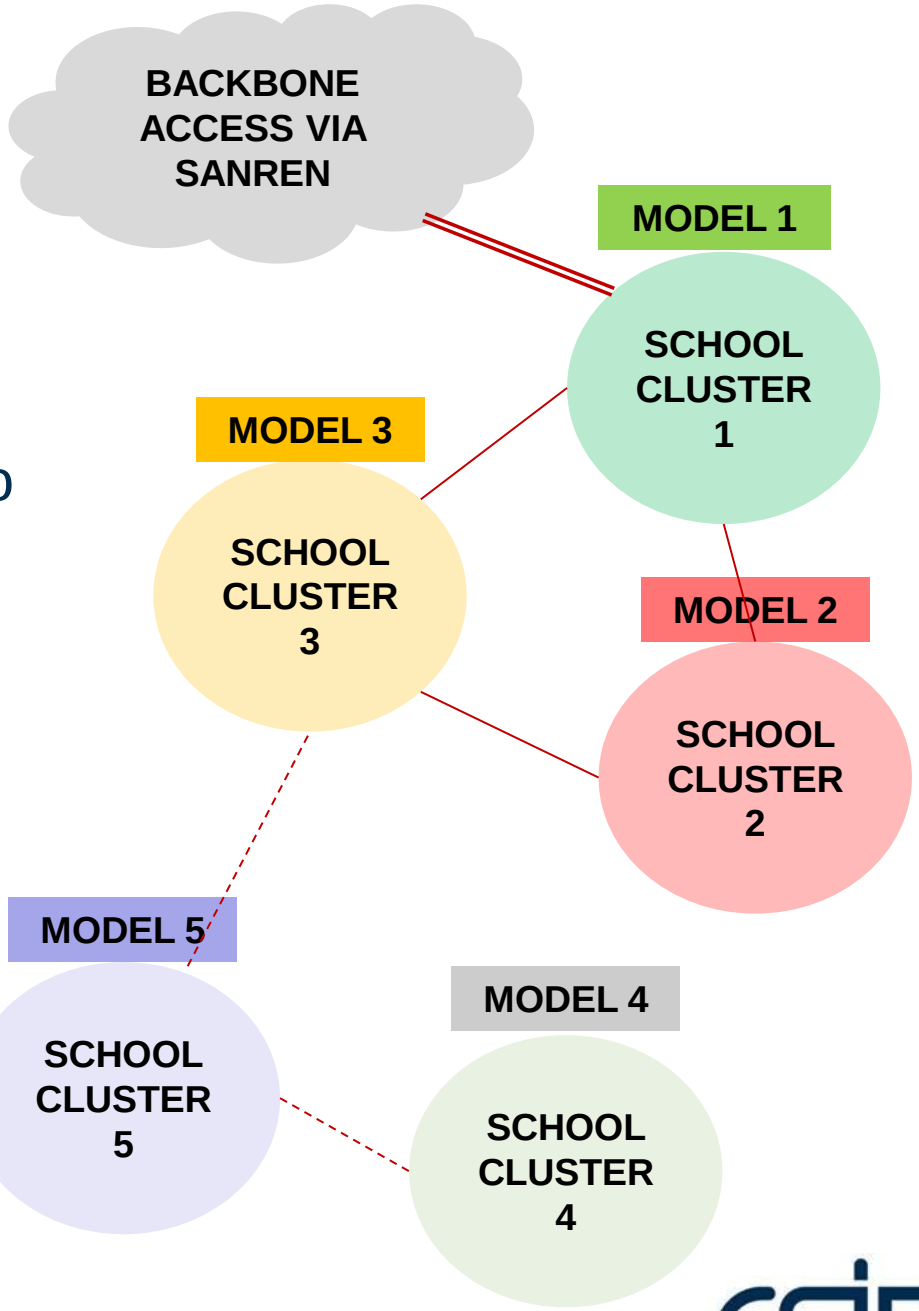
Assumptions



- ✓ Use of **SANReN** to provide backbone connectivity
- ✓ Leverage existing **BB4All network management teams** and **infrastructure**
- ✓ Access to **Tech4RED resources** (e.g. office space, community specialists, etc.)
- ✓ Leverage existing educational initiatives in Cofimvaba
- ✓ **Tablet prices** will continue to drop (and manufacturers/ suppliers will subsidise prices to be part of pilot)

Concept

- Local wifi network per school
- Schools physically close clustered in groups of 5-6 (5 groups altogether)
- Schools in each cluster linked to each other via wireless mesh
- Clusters linked to each other where possible
- Different models tested in each cluster:
  - ✓ Devices
  - ✓ Content management process
  - ✓ Device management
- Rollout 1 cluster per month, Feb 2013 to July 2013



Model per School

Training

Change Management

SMT

Educational Training

Educators

Devices

Educator Device

10” Android

Learner Device

Shared: 7” tablet (R-6)
1 to 1: 7” tablet (7-12)

Support

Technical

Local youngsters

Pedagogical

Teacher support

Content

Foundation

Numeracy, Literacy & EFAL

Gr 4 - 12

Maths, Science & EFAL

Infrastructure

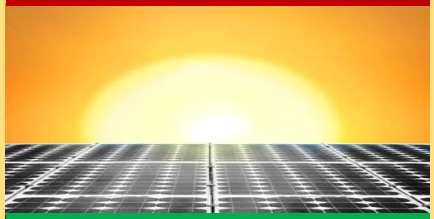
Wifi

Local to the school

Storage & Charging

Lockers + battery backup

Solar Power



Where needed

School Content server

Accessible via Wifi

Model: FOUNDATION PHASE

Content	Learner Device	Usage
Numeracy, Literacy & EFAL DBE Workbooks Additional preloaded child-friendly content	Ruggedised 7” Android device Wifi-only	Shared device Controlled use in the classroom “Sandbox”

Model: INTERMEDIATE PHASE

Content	Learner Device	Usage
Maths, Science & EFAL DBE Workbooks Additional preloaded child-friendly content	Ruggedised 7” Android device Wifi-only	Personal device Controlled use in the classroom “Sandbox”

Model: Gr 7 to Gr 12

Content	Learner Device	Usage
Maths, Science & EFAL DBE Workbooks Additional preloaded child-friendly content	Ruggedised 7” Android device Wifi-only	Personal device Controlled use in the classroom Home use

Model: Educator

Content	Device
Teacher “edupack” Additional preloaded educational content	10” Android device Keyboard 3G option HDMI
Usage	**Training & Support**
Personal device Use in the classroom Home use	Courses Pedagogical support person Technical support

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Outcomes - Educational

Learners	Teachers	Schools	Government
Improved **access to learning resources** Improved **ICT literacy** Improved **21st Century skills** Increased **worldview** Understanding of **digital citizenship** and **digital footprints**	Improved **access to teaching resources** Improved **ICT literacy** Improved **21st Century skills** Access to local **communities of practice** and support systems Training and support delivered to teachers **empowers teachers** to realise their teaching potential Stimulation of teachers (and learners!) to **develop and share own content**	In-depth understanding of use of **ICT in-classroom** with associated **change management** required forms a knowledge base for design of future **ICT in education strategies** **Understanding differences in use and usability of technology** by teachers and learners from Grade R to Grade 12.	**ICT for Education models** that are backed by research that can be **sustainably implemented and expanded on a national basis.** In-depth understanding of use of **ICT in schools** and associated **change management** required forms a knowledge base for design of **future ICT in education strategies** Building knowledge on the **transformation of the National and Provincial Educational Systems' supply chains** to deliver and support electronic content and devices.

Outcomes - Community

- Learners expose families to ICT
- Learners expose families to digital educational resources
- Delivering local support creates skills and jobs
  - ✓ Local support people can diffuse skills into the community (local training)
  - ✓ 2 jobs at 26 schools = 52 jobs

Outcomes - Technical

- In-depth understanding of cost-effective models for electronic content distribution and updating of ICT devices in rural areas with online/off-line connectivity.
  - ✓ **TCO = R198 per month per device (1 to 1: Gr 4 to Gr 12)**
  - ✓ **TCO of Gauteng Online = R350+ per month per PC/laptop (shared 30 to 1)**
- Improved use of local technical support in an integrated ICT support system to improve efficiency and cost-effectiveness.


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