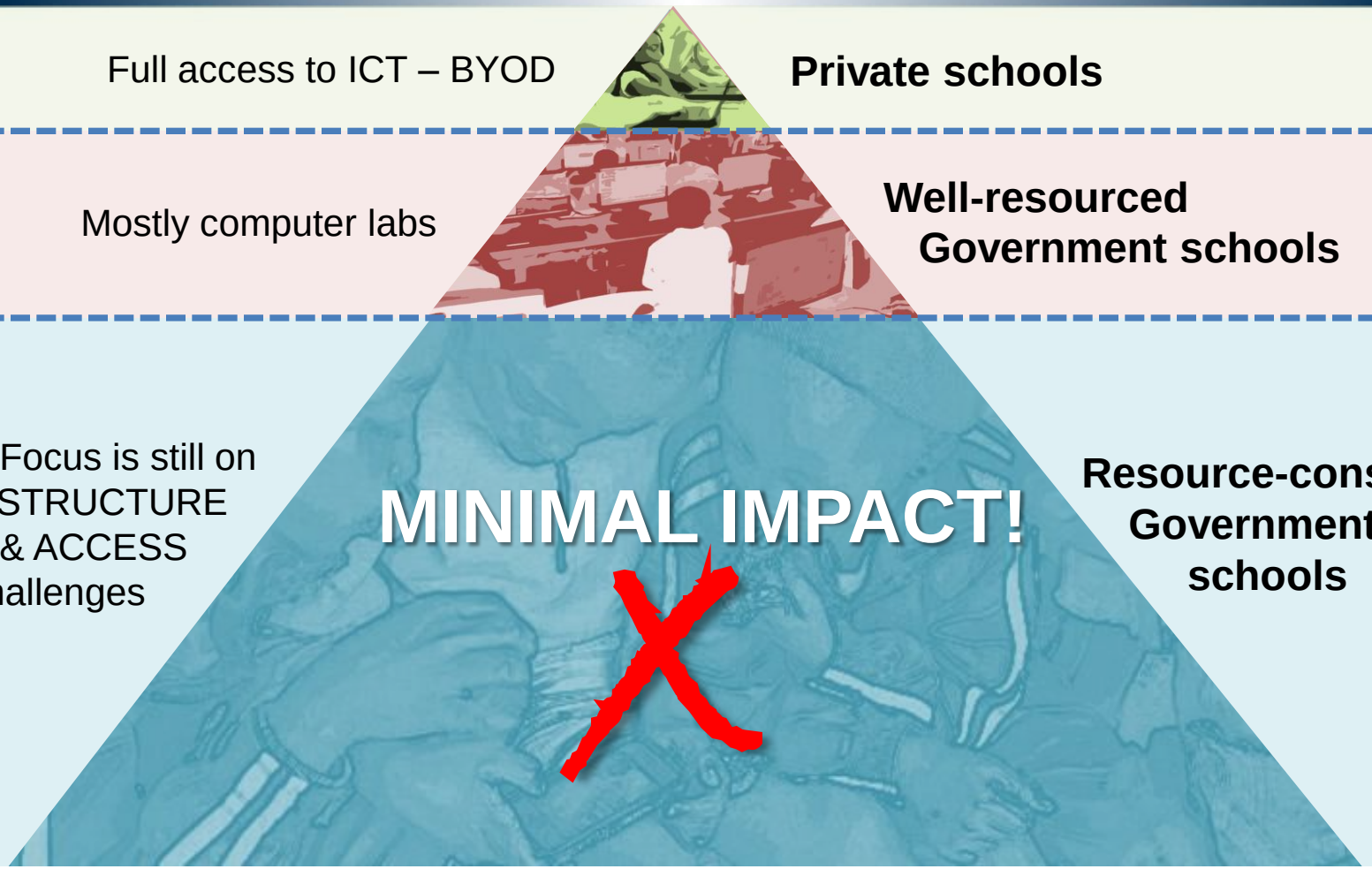
Implementation of ICT in rural schools in the Eastern Cape:

The ICT4RED Cofimvaba Story

M. Ford, A. Botha, CSIR Meraka

"CONTEXT IS KING"



South African schools and ICT


CHALLENGE:
We need to move from this…
2013/05/07


…to THIS!!!

TECH4RED

ENHANCING EDUCATION

A PARTNERSHIP BETWEEN

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Province of the
EASTERN CAPE
EDUCATION

rural development & land reform
Department:
Rural Development and Land Reform
REPUBLIC OF SOUTH AFRICA

Aim

To contribute to the improvement of rural education through technology-led innovation

Focus Areas

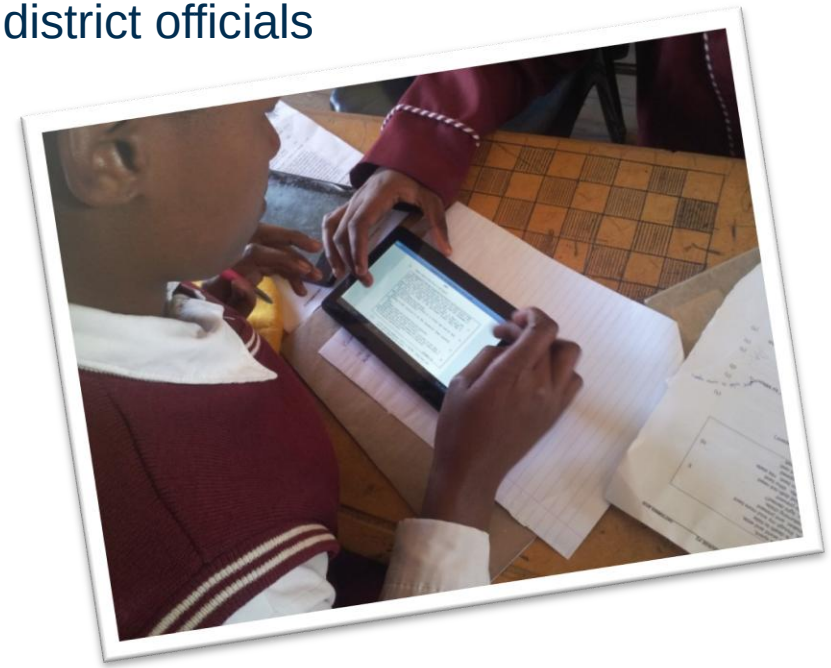
- eHealth
- Nutrition
- Water & Sanitation
- Renewable energy
- Science and Technology Centre
- Teacher and Learner support
- ICT for Rural Education Development (ICT4RED)

ICT4RED
ICT for Rural Education Development

M. Ford, CSIR Meraka

ICT4RED Scope

- Provide tablets to teachers, learners and district officials at 26 Nciba Circuit schools, within the Cofimvaba School District
- 6 500 learners, 350 teachers, 16 district officials
- Test various models, in terms of
  - ✓ Devices (tablets)
  - ✓ Content
  - ✓ Infrastructure
  - ✓ Connectivity
  - ✓ Integration into the school
  - ✓ Costs (TCO)
  - ✓ Sustainability
  - ✓ Logistics
  - ✓ Support & Maintenance
  - ✓ Operations
  - ✓ Change Management
  - ✓ Teacher training



in order to improve learner educational performance in the circuit

- In parallel with existing paper-based textbooks
- CSIR Meraka has overall Project Management responsibility

Principles


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

Approach

WITH vs TO
Respect & Humility
EARN vs GIVE
Flexibility
Innovation & Creativity

ICT4RED Methodology

- **Apply, learn and develop "best practice"**
  - Aim is to use the learning to influence similar projects, to increase the probability of success
  - Success = improved teaching & learning = improved educational outcomes
- **Ensure long-term sustainability by working within the system**
  - Partnerships with DBE, ECDoE and District
  - Strong focus on capacity development
  - Move at a pace that is sustainable within the system
- **Education-focused vs technology-focused**
  - Focus on educational issues (lack of teaching skills, content knowledge)
- **Empower the teachers first**
  - Teachers are the gatekeepers in the classroom – critical to get buy-in and active engagement
  - Teacher Professional Development focus is on "teaching strategies" supported by technology – 10 modules
  - Aim is to improve teaching skills
- **Prepare the schools**
  - Change Management – how to manage technology in a school environment
  - Infrastructure preparation – security, power, ICT
- **Technology must be earned**
  - Proof of application for teaching & learning
  - Badge system used for micro-accreditation

“12 Component Implementation Model”

NOW

Pedagogy and teaching practise consisting mainly of behavioural methodologies, e.g. “chalk-and-talk”

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

LEARNERS & HOME

TEACHERS & SCHOOL

GOVERNMENT & POLICY

Replicable Model

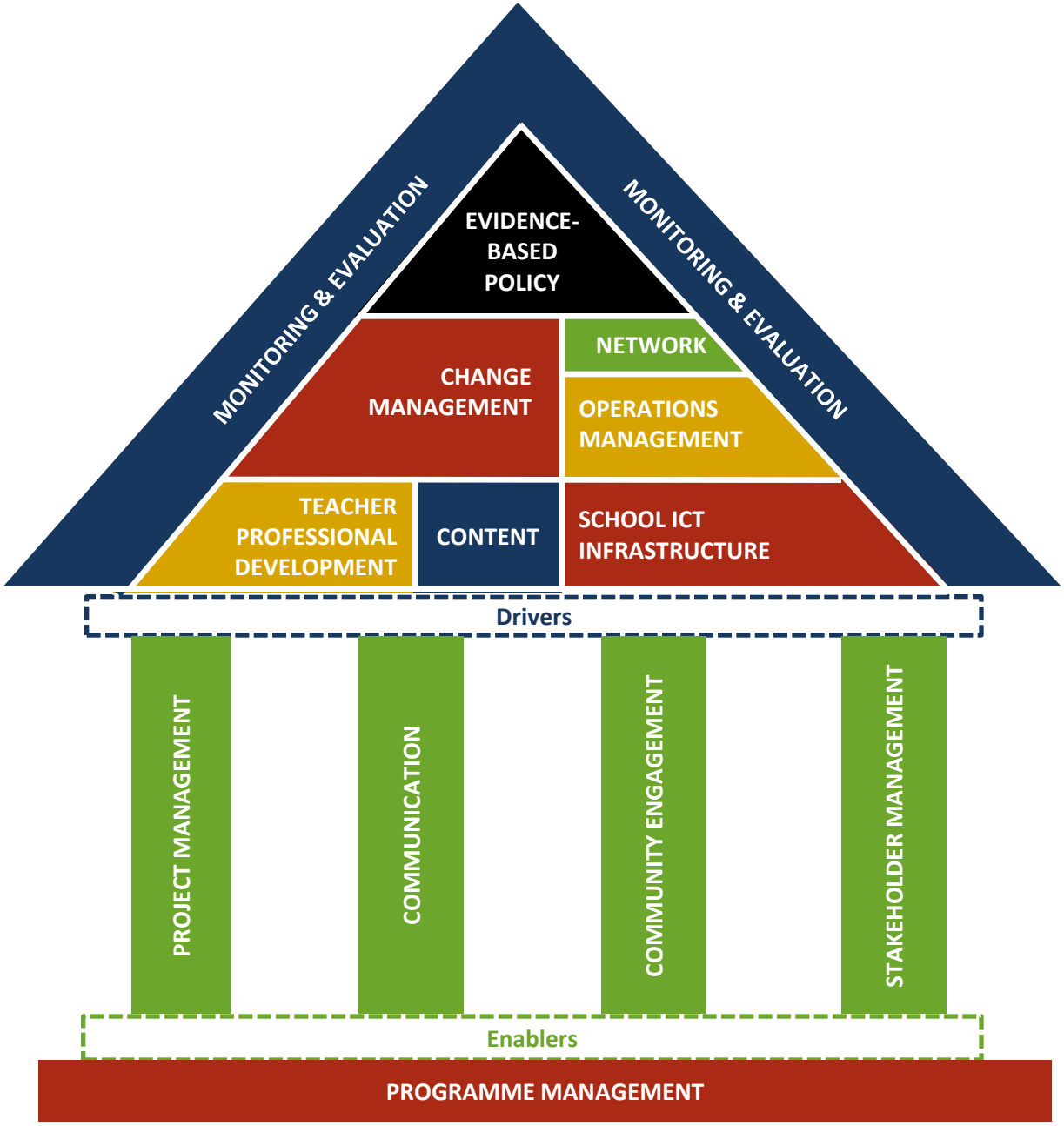
21st Century Schooling

Pedagogy and teaching practise consisting of modern, advanced, technology-integrated pedagogies

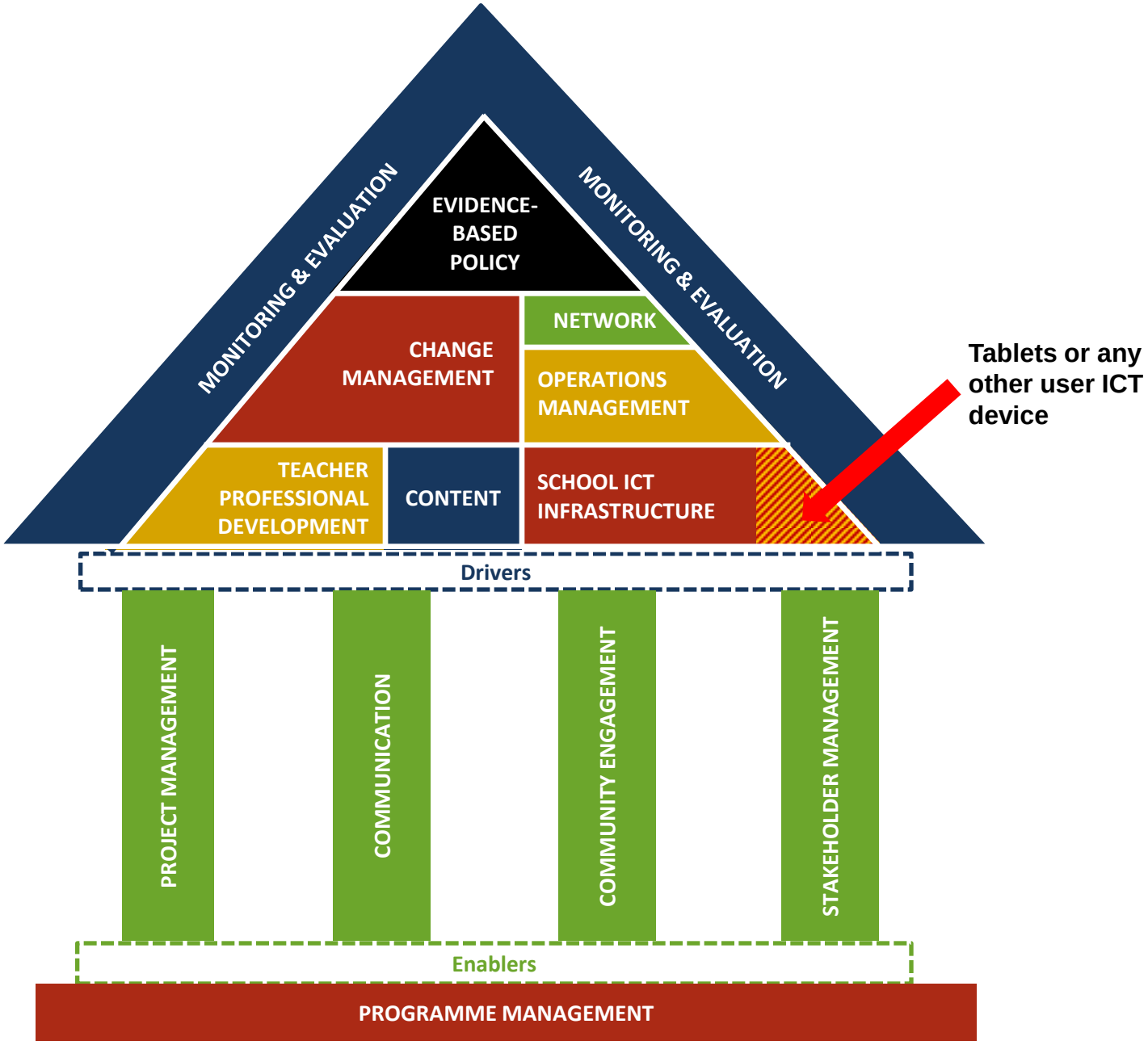
Learning and Teaching Support Material consisting of interactive multimedia learning resources

Programme Management

PROJECT MANAGEMENT Financial Management Procurement Implementation management	**SCHOOL ICT INFRASTRUCTURE** Devices Wireless LAN Storage and Power	**NETWORK** WiFi Mesh / Satellite Backbone connectivity Internet
CHANGE MANAGEMENT People (District, SMT) Technology Process	**TEACHER DEVELOPMENT** Training Preparation In the classroom	**CONTENT** Standards Conversion Creation & Customisation
OPERATIONS MANAGEMENT Logistics Support & Maintenance Distribution	**COMMUNICATION** Marketing strategy Social Media Strategy Knowledge management	**MONITORING & EVALUATION** Learners Teachers School
EVIDENCE-BASED POLICY Academic research Implementation guidelines Policy guidelines	**COMMUNITY ENGAGEMENT** Learners & Parents Teachers Community	**STAKEHOLDER MANAGEMENT** District/Circuit officials Local leadership Provincial



ICT4RED Implementation Framework



ICT4RED Implementation Framework

Tablet rollout to date

Tablets

Phase 1 (2012/13):	Teachers	16
1 school	MobiKits (mobile shared tablets)	20
	Learners	310
Phase 2 (2013/14):	Teachers	145
+ 11 schools	District officials	20
	Training facilitators	12
TOTAL TO DATE		**523**
	MobiKits (Feb-Mar 2014)	220
	Learners (approx.)	1000
Phase 3 (2014/15):	Teachers (approx.)	180
+ 14 schools	MobiKits	300
	Learners (approx.)	2000
	District officials	30
TOTAL ANTICIPATED		**4233**

Number of stolen tablets to date: **4**

All the teachers at the pilot school, Arthur Mfebe were provided with 7-inch tablets, under the innovative CSIR Meraka “EARN AS YOU LEARN” model, where each teacher had to agree to attend each training course and do their homework, in order to “earn” their tablets.

TECH4RED

On 18 July 2013, matric learners at Arthur Mfebe, the first pilot school, were each given their own tablet. Parents were present at the celebration.

School ICT infrastructure rollout to date

Completed

Phase 1 (2012/13):
1 school

School WiFi network
Local content server + UPS
Secure storage & charging room with lockers
Internet connectivity via satellite

In-progress (installation early 2014)

Phase 2 (2013/14):
+ 11 schools

School WiFi network
Local content server + UPS
Secure storage & charging room with lockers
Internet connectivity via satellite

To do (installation mid-2014 – end-2014)

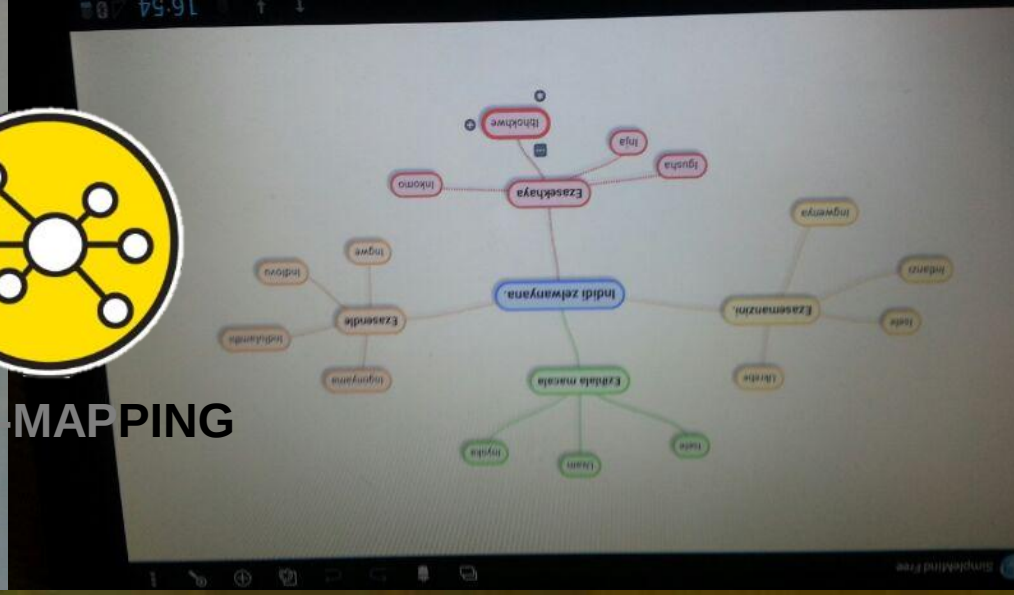
WAN connectivity via wireless mesh
Link to SANReN for broadband internet connectivity

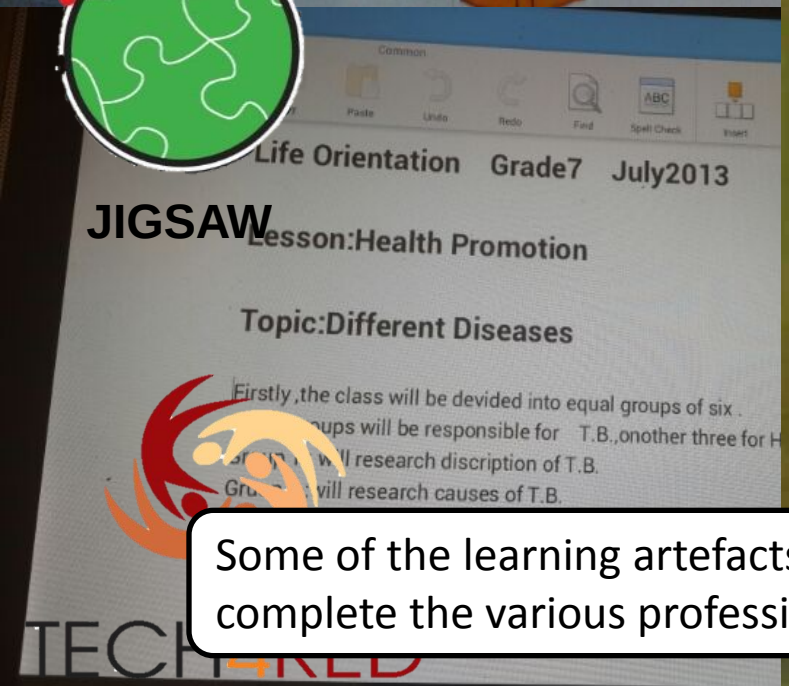
Phase 3 (2014/15):
+ 14 schools

School WiFi hotspot (NOT network)
Local content server + UPS
Secure storage & charging room with lockers
WAN connectivity via wireless mesh

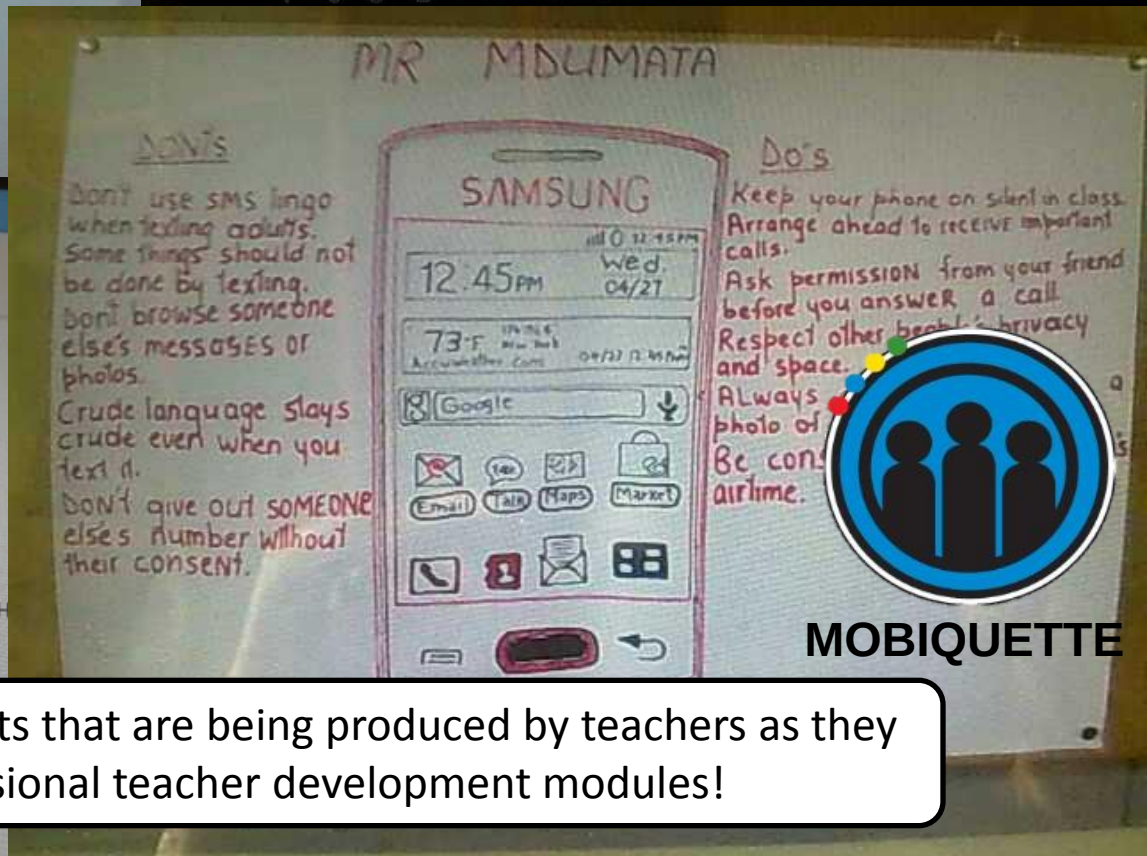
Professional Teacher Development was in full swing by August 2013 (2 weeks after receiving their tablets), where the teachers began focusing on various teaching strategies and comfortably and competently using their tablets to support their teaching.

MIND MAPPING





JIGSAW

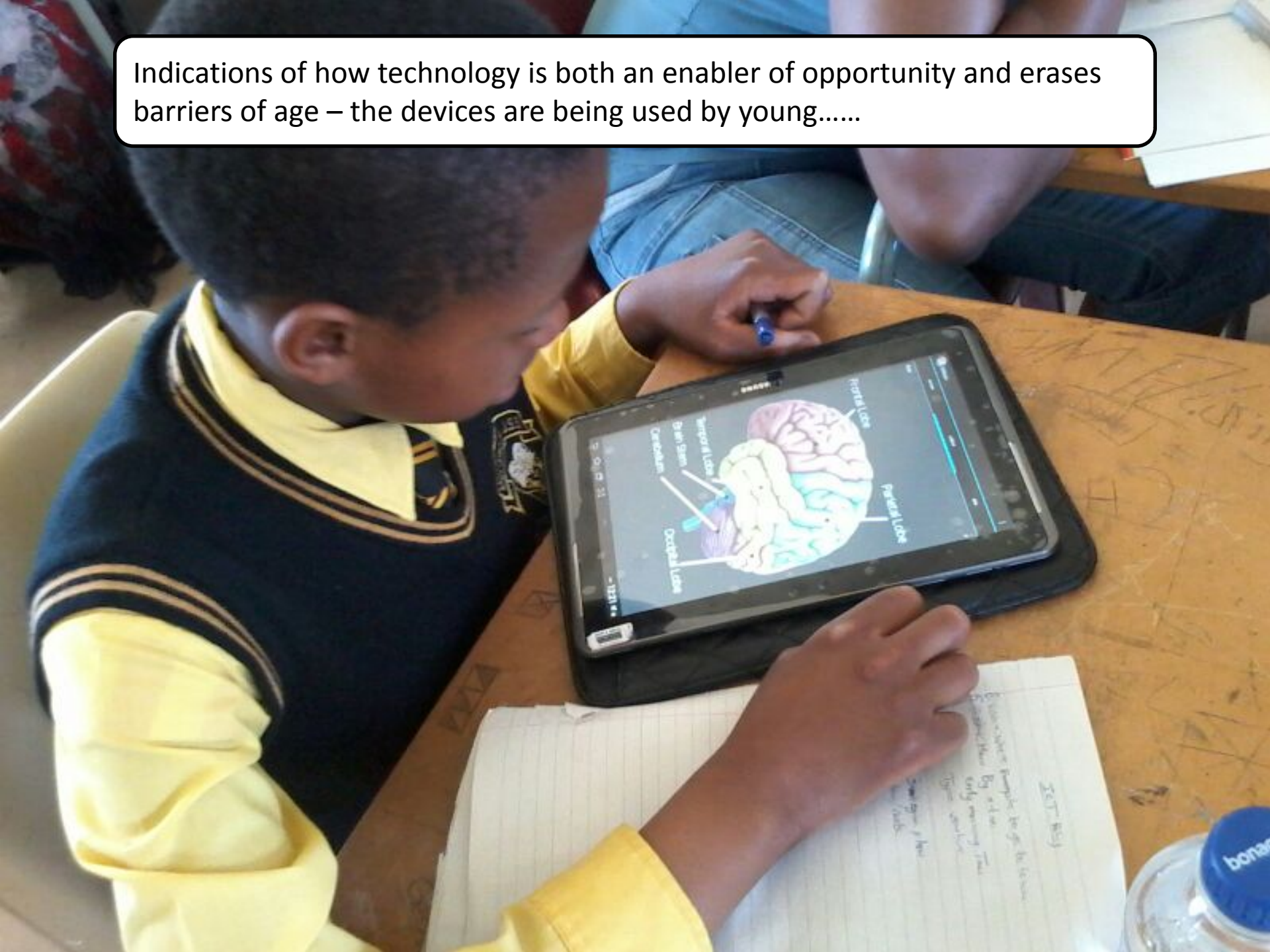


MOBIQUETTE

Some of the learning artefacts that are being produced by teachers as they complete the various professional teacher development modules!

The little school that could! Celebrations at Zamuxolo Junior Secondary School, which became the first school to earn a projector via the EARN AS YOU LEARN system, despite being one of the most disadvantaged schools in the project.

TECH4RED


Indications of how technology is both an enabler of opportunity and erases barriers of age – the devices are being used by young……


ROLE PLAY
….. and old!

Issues & Risks

- **State of buildings** – impacts the ability to securely store and charge the tablets (e.g. sagging roofs, gaps in walls, damp, leaking, etc.). Need to fix the infrastructure first.

- **Rationalisation/Realignment** - Grade 8, 9 classes from Junior Secondary schools that are close to Senior Secondary schools will be merged into new "Secondary Schools" in 2014. This will cause severe disruptions in schools – Arthur Mfebe, Khwaza, Siyabalala, St Marks, Ntshingeni.

- **Sustainability** – This is still an urgent issue. The current ECDoE budget and strategy does not make provision for operational costs of this initiative. Because ICT4RED is cross-cutting – i.e. eLearning + LTSM + Teacher Professional Development + curriculum, there may be an opportunity to combine these budgets.

- **Crime** – There have been 2 break-ins targeting schools we are working in. This will escalate once tablets are widely rolled out to learners.

- **Lack of communication infrastructure** – This affects all the schools and impacts the costs severely. Many of the schools have no cell phone connectivity at all. The plan to use wireless mesh to connect schools and then access SANReN as a backhaul option is on hold as the closest SANReN node is in Butterworth and not Queenstown as originally anticipated. Satellite is being used as a "quick fix".

Reflection & Learning: MODELS

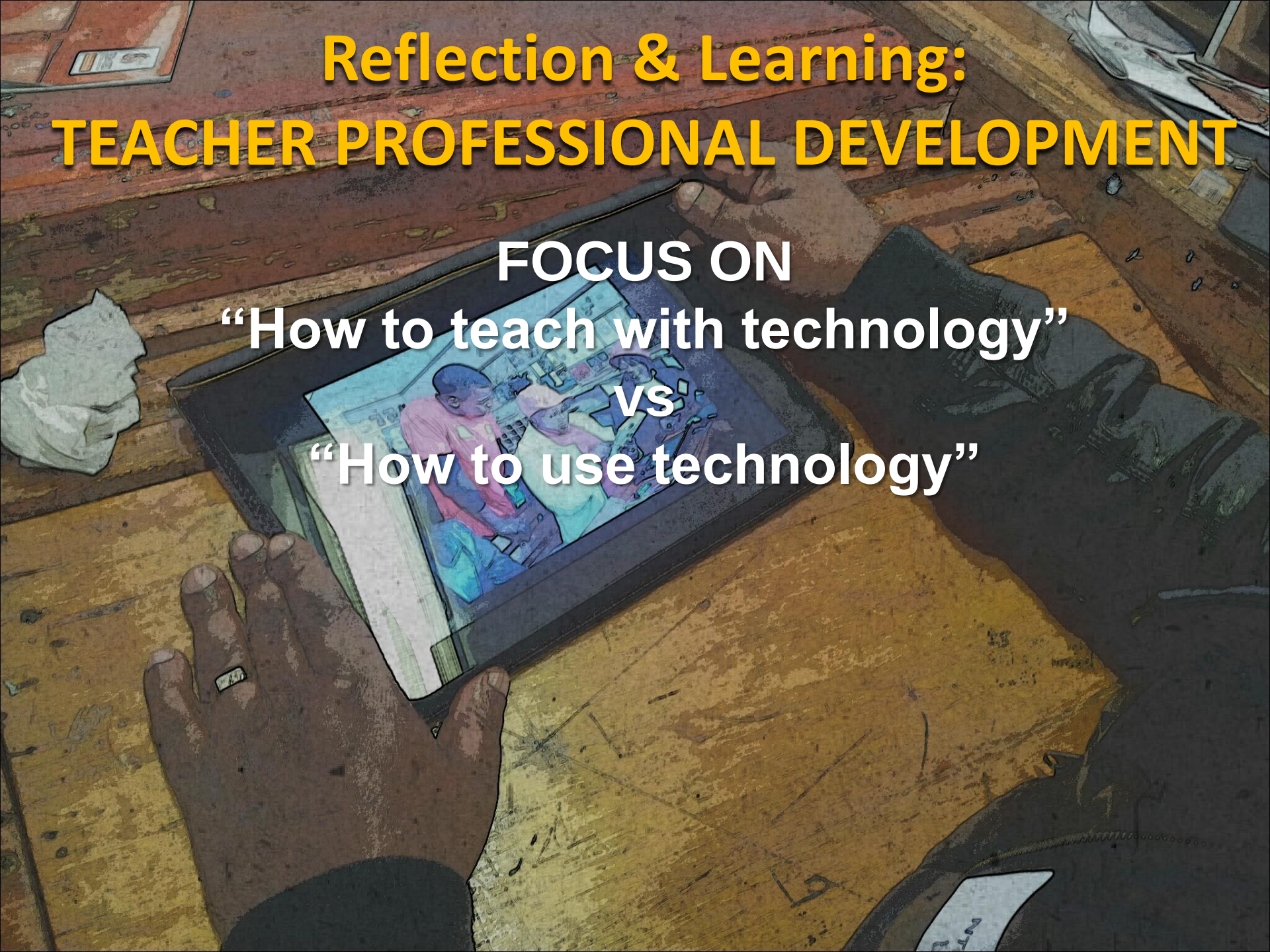
ONE SIZE *DOESN'T* FIT ALL!

Reflection & Learning - MODELS

- Model/framework starting to emerge that will allow **replication on a wide scale**, whilst ensuring **best chance for success**.

- The decision to start small and expand into the **circuit**, then potentially into the **district** and **province** was a good one, as it enables the system to absorb the changes, develop the skills and capacity to manage the technology and provides accessible support systems (e.g. school to school support). Sustainability becomes probable.

- Excellent buy-in, trust relationship and **support from district** – from the top, all the way through to the officials – is a major contribution to success thus far.


Reflection & Learning:
TEACHER PROFESSIONAL DEVELOPMENT
FOCUS ON
“How to teach with technology”
vs
“How to use technology”

Reflection & Learning - TPD

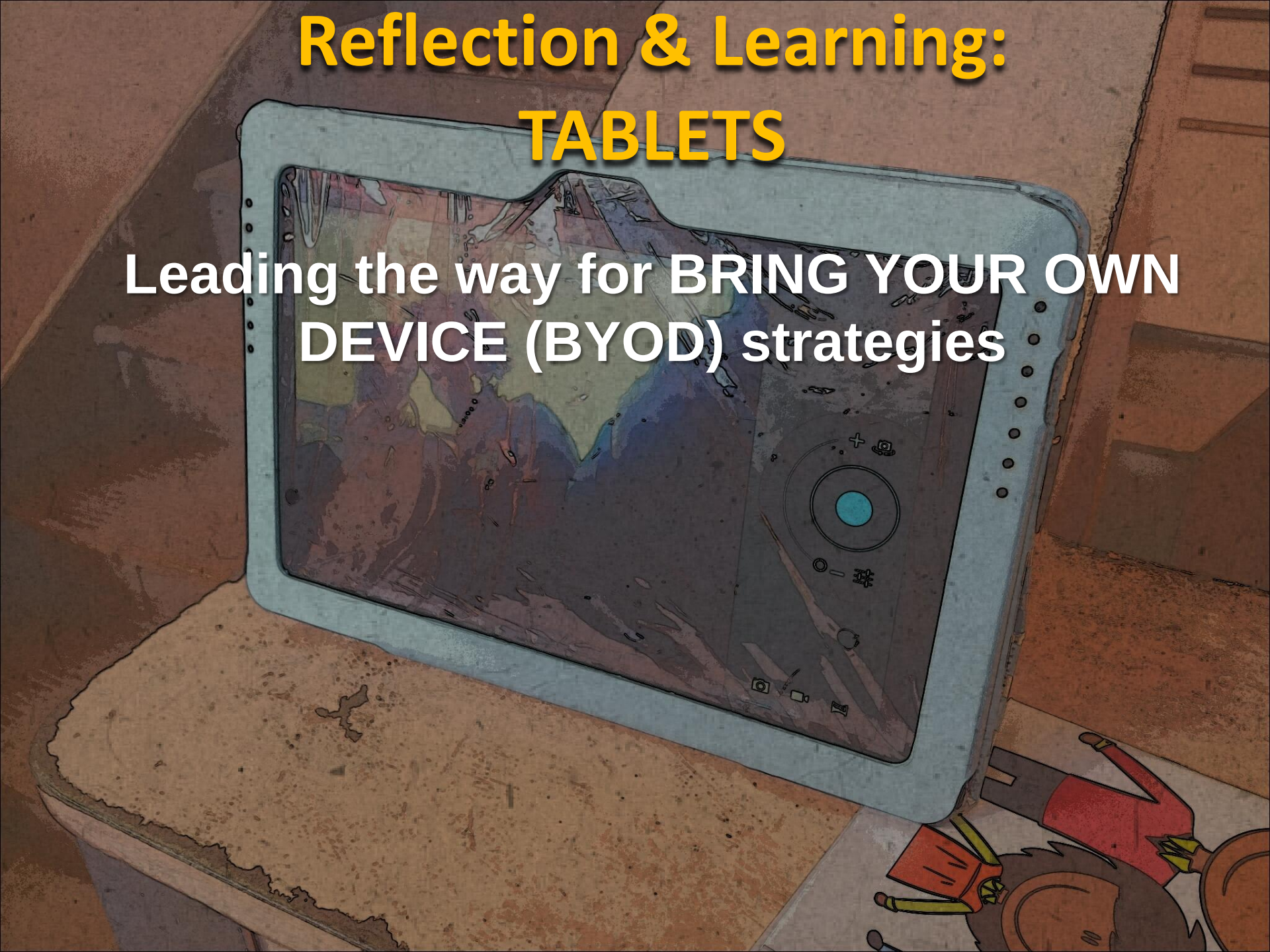
- The current model is based on **empowering the teachers** (tablets and professional development) and **preparing the schools** (change management and supporting infrastructure) before rolling out to learners.

- The model being developed is **education-focused** NOT technology-focused. Teacher professional development modules enable teaching strategies with technology as a tool. Many of these can be used in the absence of technology as well. The expected outcome is better teaching.

- The **Earn As You Learn (EAYL) badge system** is incredibly successful. The decision not to give technology to anyone, but for them to earn it by working for it, is something that can be widely replicated. It has led to impromptu study groups by teachers after school, as they work together to earn badges as individuals and as schools, so that they can get the rewards (such as a projector for the school).

- Teachers **teach the way they're taught**. By modeling the teaching strategy during TPD, it becomes easier for them to mimic in the classroom. Important for teachers to have a **"safe space"** to try things out. We designed a **FUN** experience for them.

Reflection & Learning: TABLETS



Leading the way for BRING YOUR OWN DEVICE (BYOD) strategies

Reflection & Learning - TABLETS

- It is possible to **effectively use tablets in an offline mode** (i.e. no connectivity), as long as there is sufficient useful preloaded content on the tablets.

- The **ease-of-use** and **multimedia capability of tablets** lend themselves perfectly to environments where people are mostly comfortable with cellphones as ICT devices. No “computer literacy” challenges!

- It is difficult to select good tablets – there are problems even with so-called reputable companies. We have developed a **multi-criteria decision-making tool** to support schools and test all tablets in the lab. Need to **revisit specs every 3-6 months** as the technology improves

- Important to **develop standards-based criteria** and NOT product-based criteria for tablets – gives parents/government choice based on budget and prepares the way for a “Bring Your Own Device” scenario

- Biggest challenge experienced with tablets is **battery power**. Tablets do not perform to spec and last 4-5 hours max. This points very strongly to a replacement policy of every 2-3 years as the technology becomes obsolete and unusable due to battery age.

Reflection & Learning: CONTENT

Huge GAP/OPPORTUNITY for locally-relevant interactive, multimedia content

Reflection & Learning - CONTENT

- Appropriate curriculum-aligned **content is still a major challenge**, especially for younger learners. There needs to be a push to get SA-contexual content developed that is designed for mobile devices. There also needs to be a renewed definition of content to make provision for digital, multimedia content types (or else you get the typical “textbook behind glass” syndrome).

- Content ONLY in the **cloud is NOT a viable solution** for the forsee-able future. The bandwidth challenges are significant– a study in the UK has specified that you would need 100mbs minimum bandwidth for a school of 700 learners. The solution being tested in Cofimvaba consists of a local content server, that is synchronised to a central server when traffic is low (e.g. at night). Teachers and learners have an “internet-like” experience by accessing the local content server containing the cached content.

- Need **content standards** that are device independent!

Reflection & Learning: INFRASTRUCTURE

Still a HUGE challenge!

Reflection & Learning - INFRASTRUCTURE

- Still a huge challenge – from building infrastructure, to power infrastructure, to network infrastructure. There will need to be a **significant investment** in infrastructure.
- Urgent need to investigate **new network infrastructure opportunities** – TV Whitespace, LTE, 3G, etc. These issues are technically solvable!
- In a recent RFP process to provide **satellite connectivity** to schools, there were **orders of magnitude differences in pricing** between vendors, even though they were provided with a very specific templates. This can be a huge problem for the uninformed.
- It's critical to make provision for **secure charging** in the school environment – this has implications on power needs and costs in the school


INTEGRATING ICT INTO TEACHING AND LEARNING REQUIRES A PARADIGM SHIFT AND OPEN MINDS

The mind is not a vessel to be filled but a fire to be kindled.

Plutarch

THANK YOU