TAKING STOCK/LOOKING FORWARD
INTERVENTIONS SHOWING PROMISE

WITS MATHS CONNECT – PRIMARY

COP, AUG 2014

Hamsa Venkat, SA Numeracy Chair

Lesson Starters project

- Focused initially on sharing FP early number sense/ mental maths tasks and 'structured' resources. Developed a workshop/demo/observe lesson starters model 3 times/year for discussing and sharing these tasks and resources
- In 2013, post-observation individual and Grade level feedback added
- 2011 baseline learner number sense interview assessments conducted in G2. Repeated in 2014 in G2 again.

LSP: Interim learner test results, G2

SEAL Stage	2011 (%) N=238	2014 (%) N=60
0 (Emergent count)	11.8	3.3
1(Perceptual count)	23.5	15
2 (Figurative count)	38.7	28.3
3 (Initial number seq)	17.6	46.7
4 (Intermed number seq)	5.5	6.7
5 (Facile number seq)	0.8	0

LSP: Interim learner test results, G2

SEAL Stage	2011 (%, n=238)	2014 (%, n=60)
0	11.8	3.3
1	23.5	15
2	38.7	28.3
3	17.6	46.7
4	5.5	6.7
5	0.8	0

Count all or less sophisticated methods

73.9%

LSP: Interim learner test results, G2

SEAL Stage	2011 (%, n=239)	2014 (%, n=60)
0	11.8	3.3
1	23.5	15
2	38.7	28.3
3		46.7
4		6.7
5		0

Count all or less sophisticated methods **73.9%**

Count on or more sophisticated methods **52.4%**

LFIN Stage	Descriptor
0	Cannot count visible items
1	Can count items that are seen, heard or felt
2	Can count items in screened collections by visualising. Counting often involves 'counting all'
3	Uses 'count on' for addition problems & 'count down from' but not 'count down to' for subtraction problems
4	Can use 'count-down-to' for subtraction sums where appropriate depending on the sum
5	Uses a range of 'non-count-by-ones' strategies, alongside some counting-by-1s: Includes counting through 5 & 10, compensation/ commutativity/ seeing addition & subtraction as inverse operations

LFIN Stage	Descriptor
0	Cannot count visible items
1	Can count items that are seen, heard or
2	Can count items in screened collections b Counting often involves 'counting all'
3	Uses 'count on' for addition problems & 'count down from' but not 'count down to' for subtraction problems
4	Can use 'count-down-to' for subtraction sums where appropriate depending on the sum
5	Uses a range of 'non-count-by-ones' strategies, alongside some counting-by-1s: Includes counting through 5 & 10, compensation/ commutativity/ seeing addition & subtraction as inverse operations

2011 key threshold

LFIN Stage	Descriptor
0	Cannot count visible items
1	Can count items that are seen, heard or felt
2	Can count items in screened collections by visu Counting often involves 'counting c
3	Uses 'count on' for addition proble om' but not 'count down to' for subtrac
4	Can use 'count-down-to' for subtraction sums where appropriate depending on the sum
5	Uses a range of 'non-count-by-ones' strategies, alongside some counting-by-1s: Includes counting through 5 & 10, compensation/ commutativity/ seeing addition & subtraction as inverse operations

2011 key threshold

2014 key threshold

	Fluencies and strategies
0	Cannot count visible items
1	Can count items that a
2	Can count item Counting often
3	Uses 'count on' for add down from' but not 'count down to' for subtraction problems
4	Can also use 'count-down-to' for subtraction sums where app sum (e.g. 17 -14 vs 17 - 5)
5	strategies, alongside g through 5 & 10, comp seeing addition & subtraction as inverse operations

Fluencies:
Applicable to whole example space

Strategies:
Applicable to sub-spaces

Development task for Stages 4 and 5

Which sums should we switch around?

7 + 15

13 + 4

2 + 7

18 + 5

3 + 14

2 + 14

14 + 5

6 + 15

What connects all the sums that you have switched around?

20-day 'primary maths knowledge for teaching' course

- Numbers attending up year on year (2012 – 33; 2013 – 37; 2014 – 41)
- Median score increase from pre to post-test (focused on content knowledge) without teaching to the test (2012 – 48% to 62% ; 2013 - 42% to 58%)
- Possible to improve primary maths content knowledge

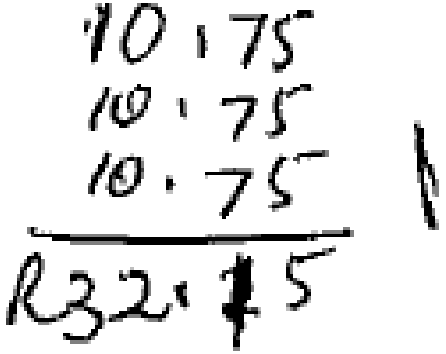
Representational shifts

- Pre test

1 litre of petrol costs R10.75

Provide a method AND an explanation for working out the costs of:

a) 3 litres of petrol



17/37 correct answers

Representational shifts

- Post test

Provide a method AND an explanation for working out the costs of:

a) 3 litres of petrol

1 ℓ	1 ℓ	2 ℓ	3 ℓ
cost	R10,75	R21,55	R32,25

I have shown my answer on a ratio table. 1ℓ=R10,75 and two ℓ will be R10,75 + R10,75 = R21,55 and 3ℓ will be R10,75 + R10,75 + R10,75 = R32,25 This is a repetitive addition.

b) 0,53 litres of petrol

31/37 correct answers

Flagship projects focused on teaching

Mathematics teaching

Lesson starters project

- **Initial focus on provision of tasks/ resources for number sense & mental maths**

Teachers' mathematical learning

20-day course – MKfT

- **Focus on connecting between representations & explanations (MDI)**

Theorizing teacher change, ground up and inclusive of context

LSP – artefact mediation

- No structured A presence
- Structured A presence
- Well-structured A presence (in example sequence that pulls towards generality/ more domain specific cognitive functioning)
- Well-structured A presence (in example as above, that works in the zpd of class

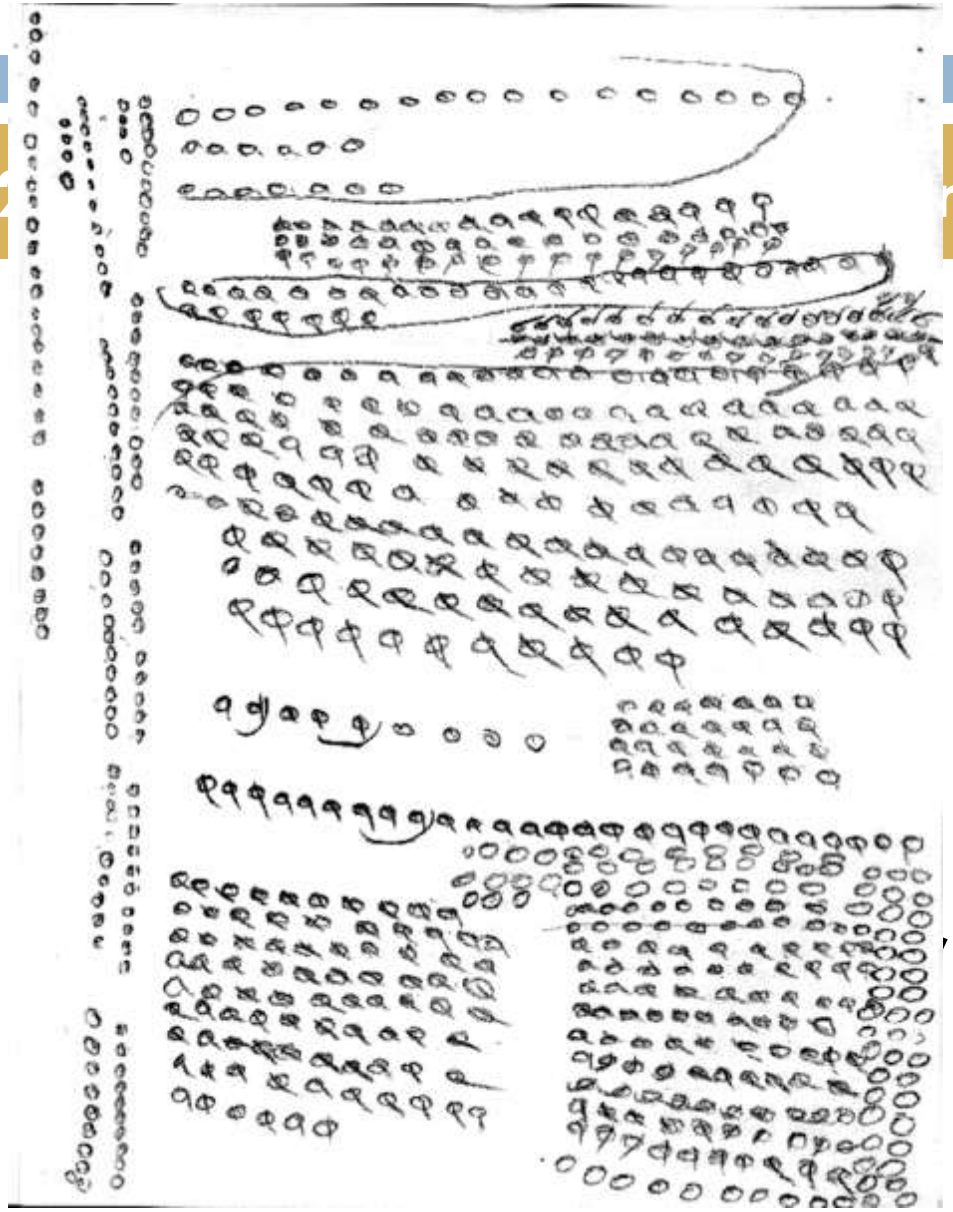
20-day course – MDI mediation

- No MDI/error-laden MDI
- MDI that connects with the concept
- MDI that connects with the concept & pulls towards generality/ more domain specific cognitive functioning
- MDI that connects with concept, pulls towards generality & works in the zpd of class

Level 1 – Artefact mediation

LSP – artefact mediation

- No structured A presence
- Structured A presence
- Well-structured A presence (in example sequence that pulls towards generality/ more domain specific cognitive functioning)
- Well-structured A presence (in example as above, that works in the zpd of class



Theorizing teacher change, ground up and inclusive of context

L

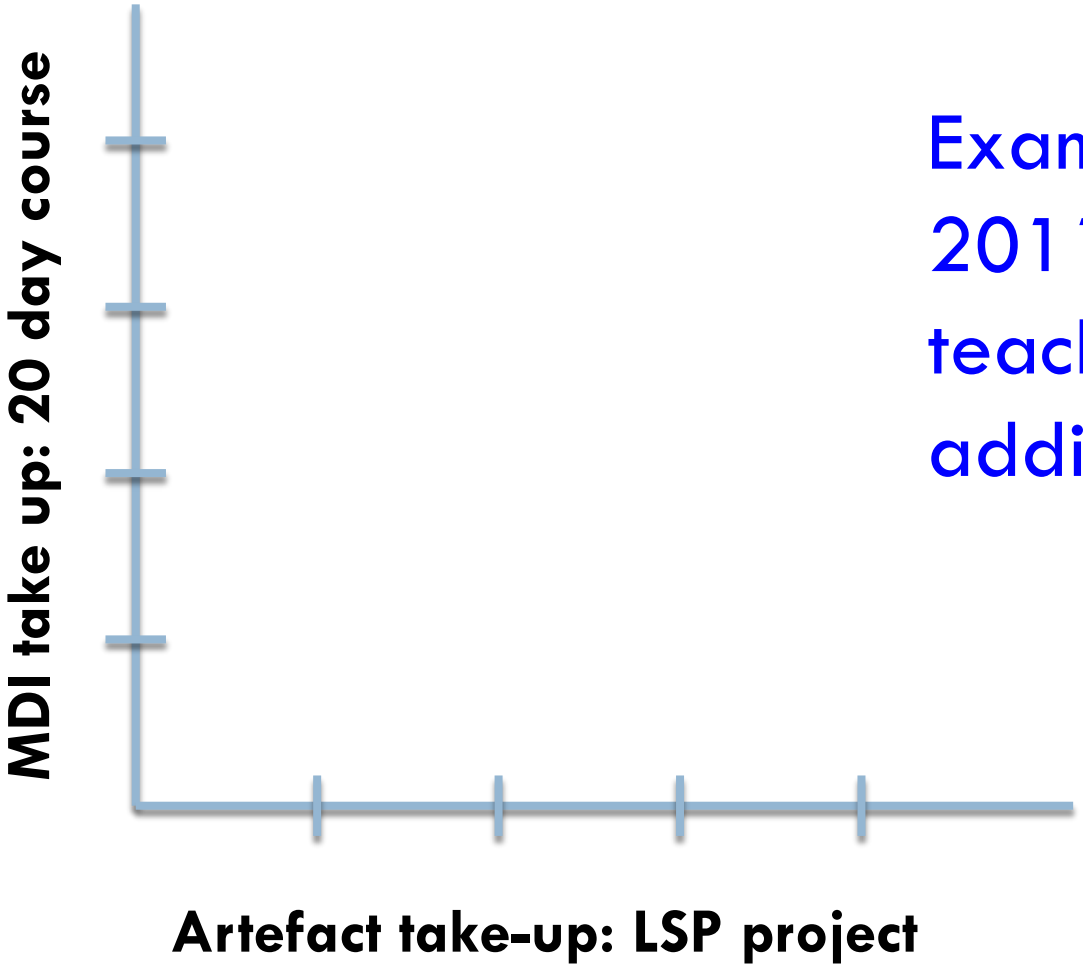
-
-
-
-

Half of 26:
Each pair in the class is asked to make 26 balls from clay – which they do. The teacher's explanation proceeds thus: 'I want us to count to 13, and move those balls aside. How many balls are on the other side? 13 as well. So 13 is half of 26.

20-day course – MDI mediation

- No MDI/error-laden MDI
- MDI that connects with the concept
- MDI that connects with the concept & pulls towards generality/ more domain specific cognitive functioning
- MDI that connects with concept, pulls towards generality & works in the zpd of class

Theorizing teacher change



Examining change 2011 to 2014 (G2) teaching of additive relations

Theorizing teacher change, ground up and inclusive of context

LSP – artefact mediation

- No structured A presence
- Structured A presence
- Well-structured A presence (in example sequence that pulls towards generality/ more domain specific cognitive functioning)
- Well-structured A presence (in example as above, that works in the zpd of class

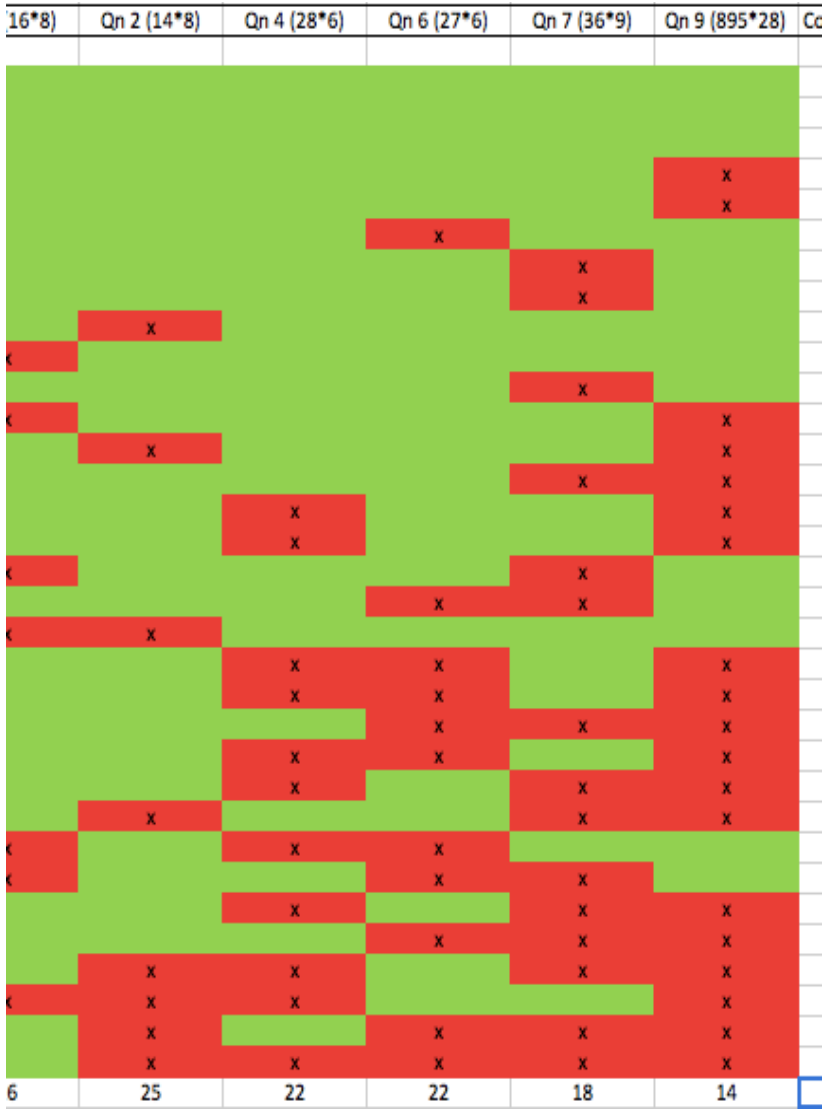
20-day course – MDI mediation

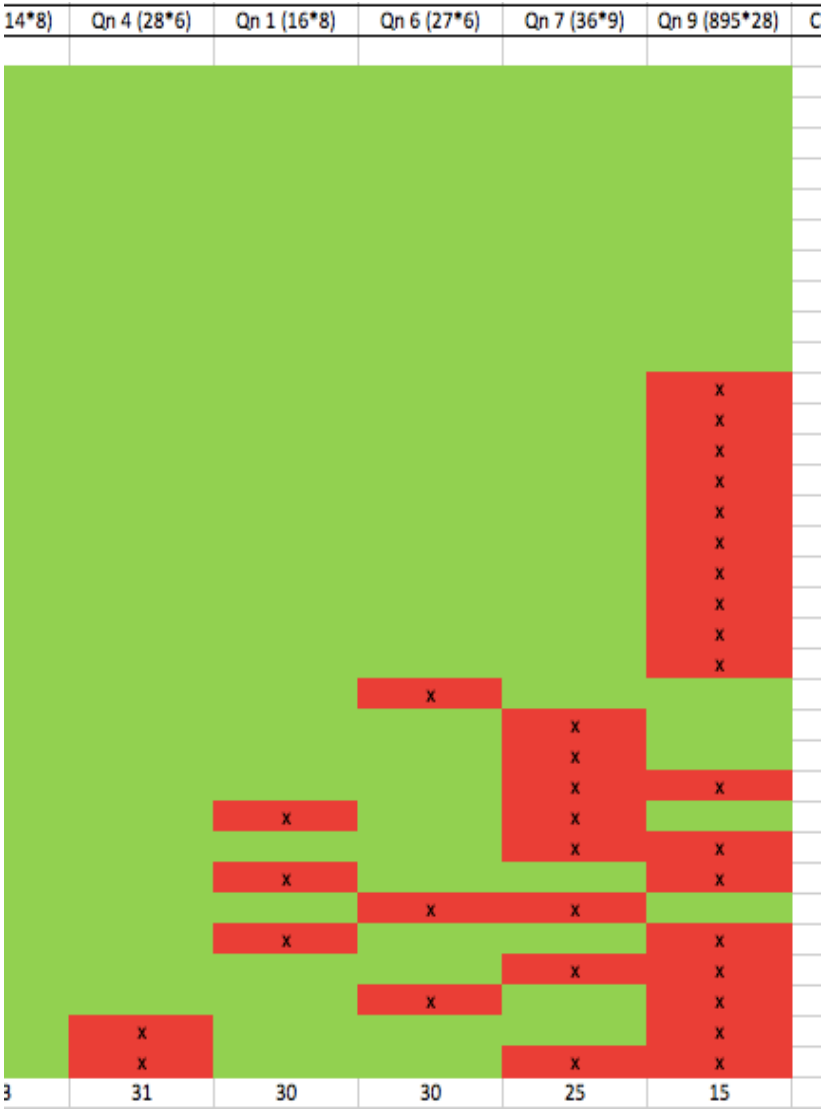
- No MDI/error-laden MDI
- MDI that connects with the concept
- MDI that connects with the concept & pulls towards generality/ more domain specific cognitive functioning
- MDI that connects with concept, pulls towards generality & works in the zpd of class

Discussing Lessons – Big Books word problems projects

- Two Masters studies: one G4 additive relations; one G6 multiplication, both based on Askew's 'Big Books'
- Paired working on carefully structured word problems, teacher-led whole class discussion of structure, models and strategies, individual working on a set of problems, whole class discussion of similarities in structure and effectiveness/efficiency of models/strategies
- Pre- and post-tests; 6 intervention lessons
- Improvements in both; more extensive in G6 multiplication study

Emmanuel Dlamini's G6 mult study





Leveraging mid-level scale

- Case studies of 'telling cases' – based on multiple observations:
  - 'extreme localization'
  - problems with the ways in which mathematics is held in Foundation Phase (SCK rather than CCK issues)
- Contributing to the national policy and primary maths teacher education landscapes
  - large proportions of Grade 6 teachers with CCK below Grade 6 level & problems with proportional reasoning

Telling multi-level stories

- Teachers' affective response shifts

When I went to college, I didn't take maths for the fear that I can fail in college. Because of the fear of maths which most of us have, I therefore took art at college. In 2011 when I e CE program I didn't take maths, I was still having t ths. But with the course that we did – Wits maths connec se is good, it improve my own knowledge of maths ar gible ways of teaching maths. If I'm giving an option now, I ely take maths because I think I'm more confident in maths ecially teaching maths at the level I'm teaching now. ***G3 t***

- Teacher knowledge change
- Teaching practice change
- Learner change

Broader research and development activity

Research

- Contributing to debates and development on primary maths in-service teacher development (AMESA Maths Teacher Education panel and SIG)
- Ongoing Teacher articles, I Hate Maths seminars, building platforms and collaborations

Development

- GIZ international study on Numeracy Teaching and Teacher Education (with Mellony Graven)
- ICMI international primary maths study on Whole Number topics, teaching and assessment (Committee member)

Intervention models with promise and follow-up

- LSP > tasks and artefacts
- Packaging tasks incorporating structured artefacts into user friendly formats
- Teacher tasks for MDI development for move into strategies
- 20 day course > devising focused and abridged packages for broader trialing with FP and IP phase/subject advisers
- Big Books model > further single case trials incl HL trials in FP, and then move to multi-class/multi-school trials

Scale up requirements

- Looking for insights from Chairs mid-level scale, and linking these to insights from case studies and larger scale interventions
- Multiple single case trials, expanding to multiple case and larger scale trials where possible
- Looking beyond ten schools, and building partnerships for broader trials in the field – with disciplinary expertise from us and larger scale trial expertise and external funding from partners
- Want careful evidence-led policy development through scaled up trial sequences rather than 'ear of government' influence

Thanks to a wonderful team!

With lots of graduations!

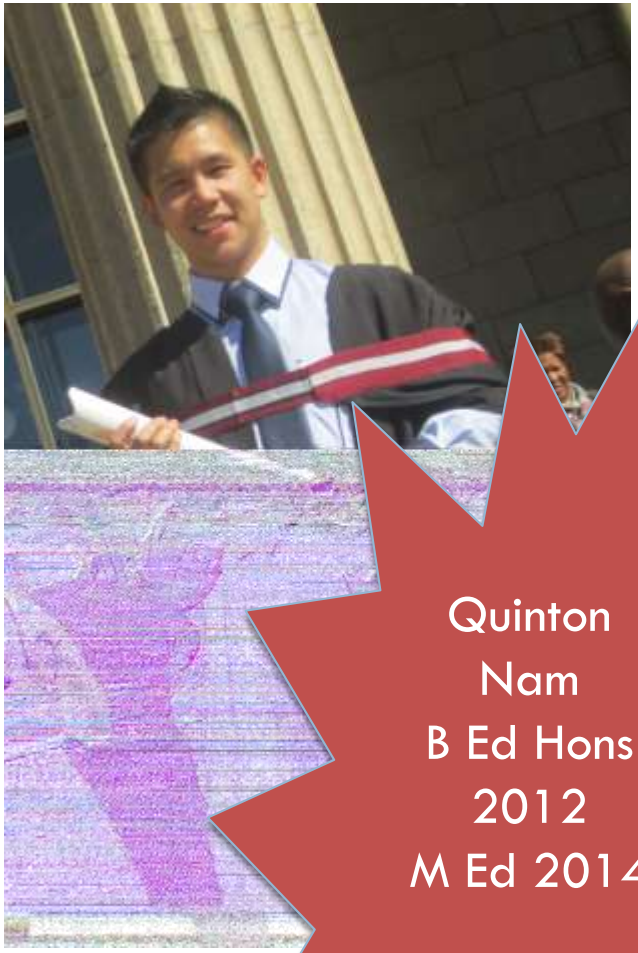
Thulelah Takane –
M Ed 2012
PhD - 2013

More graduations!

Herman Tshesane
B Sc Hons 2012
MSc 2013
PhD 2014

Marie Weitz
MSc 2012
PhD 2014

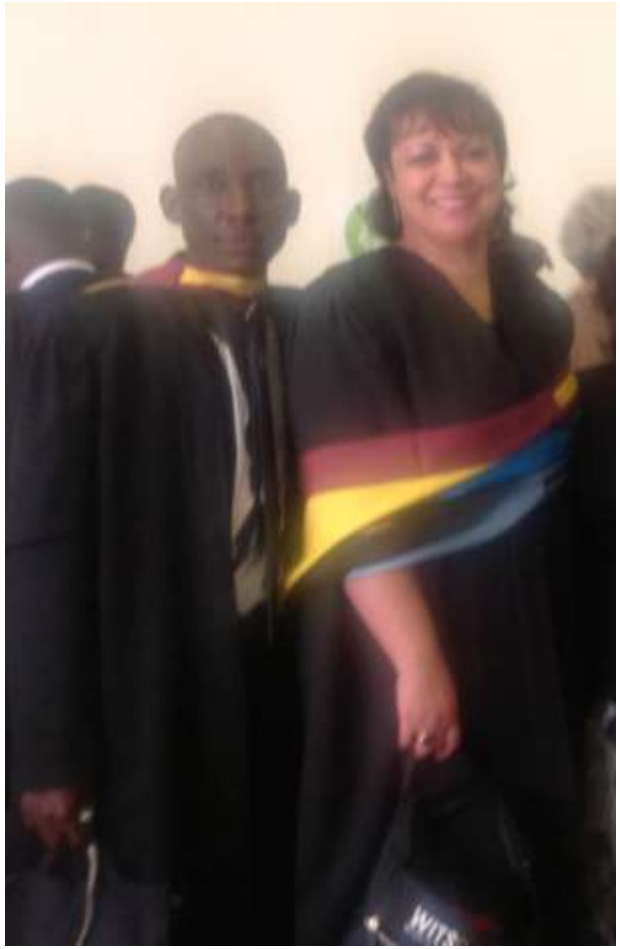
And more!



Quinton
Nam
B Ed Hons
2012
M Ed 2014

Samantha
Morrison
M Ed
2012
PhD 2013

And even more



Michele Alexander
& Gift Cheva,
graduated
M Ed 2013

Great admin support

Nomonde Mda &
Lorraine Thlwaele

And further…