South African Numeracy Chair Project
Rhodes University

Annual Community of Practice Forum

Johannesburg: August 2014
Prof Mellony Graven
Full time Chair project team
- A hub of mathematical activity, passion and innovation
- Interconnected communities of practice

- Partnership between in-service teachers, staff in Chair, key partners of the Chair
- Meet regularly & work collaboratively to address objectives from a classroom practice based perspective

- Family events
- Maths clubs
- Learner events

- Grahamstown Community
- Sustainability

- Based on active engagement of research participants in numeracy research
- Include post graduate students, teacher researchers & lecturers & professors
Discussion items

New foci in development initiatives

1. NICLE
2. Learner after-school maths clubs
3. Grahamstown ‘Numeracy Buzz’

Research progress

1. Impact & Evaluation
2. Growing the research community
3. Sharing and dissemination of research
NICLE - Teacher led workshops

Prudence van der Linde: Measurement
Workshop on teaching time

Teacher comments:

Discussion provoked more thought about the complexity of time

Very useful I now have a clearer understanding of how to teach time in my class

Excellent worthwhile resources, very excited to implement. Roger explained it in simple terms. The video he used was encouraging.
- How I teach it inputs into NICLE sessions
- 7 furthering studies officially
- 5 presented at national & regional conferences
- 6 running after school clubs
- 5 organisation of parent events
- 2 presented at district level CAPS training
- 4 conducted presentations at school
Annual data instruments pointed to some but slow progression in MR

Focused on CU and progressive levels of reasoning (Zanele Mofu) supplemented key resources

Supported in HW drive
<table>
<thead>
<tr>
<th>3.3</th>
<th>12 \times 4 =</th>
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<tbody>
<tr>
<td>10 + 2 \times 4 =</td>
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<tr>
<td>10 \times 4 = 40</td>
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<tr>
<td>2 \times 4 = 8</td>
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<td>40 + 8 = 48</td>
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<table>
<thead>
<tr>
<th>3.4</th>
<th>24 \times 6 =</th>
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<tr>
<td>20 + 4 \times 6 =</td>
<td></td>
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<tr>
<td>20 \times 6 = 120</td>
<td></td>
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<tr>
<td>4 \times 6 = 24</td>
<td></td>
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<tr>
<td>120 + 24 = 144</td>
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<table>
<thead>
<tr>
<th>3.5</th>
<th>120 \times 15 =</th>
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<tr>
<td>100 + 20 \times 15 =</td>
<td></td>
</tr>
<tr>
<td>100 \times 15 = 1500</td>
<td></td>
</tr>
<tr>
<td>20 \times 15 = 300</td>
<td></td>
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<tr>
<td>1500 + 300 = 1800</td>
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</tbody>
</table>

| 4.4 | 75 \div 3 = 25 |

| 4.5 | 120 \div 15 = 18 \text{ remainder } 10 |

| 4.1 | 6 \div 3 = 2 |

| 4.2 | 8 \div 2 = 4 |

| 4.3 | 18 \div 6 = 3 |

| 4.4 | 75 \div 3 = 25 |

| 4.5 | 120 \div 15 = 18 \text{ remainder } 10 |

| 4.6 | 18 \div 6 = 3 |

Number talks are 5-15 minute conversations around purposefully crafted computation problems, are a productive tool that can be incorporated into classroom instruction to combine the essential processes and habits of mind of doing math. Students are asked to communicate their thinking when presenting and justifying solutions to problems they solve mentally. These exchanges lead to the development of more accurate, efficient, and flexible strategies.

A key component of a Number Talks is careful planning before the number talk to design “just right” problems for students. (Parrish, 2011).

Jo Boaler strong advocate
Examples: aim - shift 1-1 counting strategies towards flexible fluency & CPV

* How many dots do you see? How did you get that?

* Calculate 12 x 7 - how did you get it?

- Opportunities for focusing on **efficiency** and explicitly promoting more efficient methods
- Opportunities for developing **learner talk** and learner fluency and **mental flexibility**
- **Gesturing** - show me! (pace)
Some teachers still reluctant for video BUT been excited by what we have seen this year

Increased: learner activity, promotion of sense making; increased coherence & connections; increased progression in lessons; increased use of appropriate resources appropriately; homework

Strong sense that learners & teachers were more relaxed and enjoying participating (not a research claim)

Acknowledge video analysis for claiming change is problematic and limited

Analysis learner books, homework books, methods on assessments and teacher comments also point to the above
Continued cost effective resource support (aids implementation)

- Wooden blocks
- Clock/Time Resources
- Measurement Resources
- Homework drive

Multiplication
Activities & Maths
Challenges

Wooden blocks
The learning stories of these educators point to the emergence of two metaphors, namely activation and reinvigoration, in relation to their mathematics learning experiences and participation in the primary maths teacher in-service programme.

Teachers with a history of mathematical competence reinvigorated their mathematical identities through participation in NICLE with some of the teachers’ identities outcropping into a wider range of mathematical and maths education practices.

The identities of teachers with weak mathematical histories (stunted by negative school mathematical experiences) become remediated, and new mathematical identities are activated through participation in the NICLE Communities of Practice.
2014 continue to run several clubs (including extension)
- NICLE teacher participation in clubs
- Masters students set up clubs for development and research
- Interest growing each year
- DoE curriculum planner for FP in the EC continuing roll out of clubs across EC
- Continuing workshops for schools and development centres
- Continuing workshops at conferences (AMESA/SARAECE)
- Continually updated website support - see posters
## Multiple math club workshop for EC educators

<table>
<thead>
<tr>
<th>Role</th>
<th>Details</th>
<th>Date</th>
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<tbody>
<tr>
<td>12 facilitators</td>
<td>from 3 organisations (Public after-maths club introductory workshop in Grahamstown)</td>
<td>21st May 2013</td>
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<tr>
<td>50 educators</td>
<td>AMESA conference (Cape Town)</td>
<td>June 2013</td>
</tr>
<tr>
<td>40 educators</td>
<td>SARAECCE conference (Port Elizabeth)</td>
<td>Sep 2013</td>
</tr>
<tr>
<td>12 staff and lecturers</td>
<td>from ITEC in East London and the Education Department at Fort Hare.</td>
<td>15th Oct 2013,</td>
</tr>
<tr>
<td>7 staff and volunteers</td>
<td>from three Grahamstown based Child Welfare Community Programmes</td>
<td>Jan 2014</td>
</tr>
<tr>
<td>23 Eastern Cape District Subject Advisors</td>
<td>Port Elizabeth</td>
<td>20th 2014.</td>
</tr>
<tr>
<td>240 teachers</td>
<td>Port Elizabeth District</td>
<td>18th June 2014</td>
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</table>
I enjoyed the workshop. It was informative and challenged some of my perspectives on teaching mathematics.

Excellent. The variety of approaches, ideas and inputs were truly inspiring. Really valuable.

(EL - ITEC Oct 2013)
Clubs opportunities for our own learning

- Explorative vs ritualised participation
- Sense making
- Independence and resilience
- Develop foundational understanding and extending - e.g. AMESA challenges
- Aha moments
- trial methods/ ideas/ resources for NICLE
Without foundational understanding learners ‘play school’ (no OTL)

ANAs & other - majority of learners still at level 1 or 2 (count all, count on but CPV and EAS weak)

25 + 36; 52 + 369; 236 x 24 majority can’t participate - there is no OTL without recovery - curriculum is beyond the ZPD for majority

Focus on recovery of foundations is essential!
How can more systemic recovery take place?

- NICLE & our research foregrounded recovery of foundations - need more whole class research
- Number talks (structured resources) especially useful for EAS & CPV
- Research exploring Wright’s recovery for whole class
PhD - 2012 case study clubs (mixed ability)

- strong learner progression across Wright et al levels from Feb - Nov 2012

Masters research studies - similar shifts

Highlights/ anecdotes 2013 clubs

- club learners moving towards ‘top performers’ in class
- attitude towards doing math hw & working with numbers transformed (Parents)
- willingness to talk/ share & engagement in class is greater - helpers (Teachers)
Family maths events
- Mathemagic assembly shows
- Fieldtrips to Sci Fest
- AMESA Maths Challenge

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<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>Changes</th>
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<tbody>
<tr>
<td>No learners who wrote 1st round</td>
<td>1025</td>
<td>1210</td>
<td>+185</td>
</tr>
<tr>
<td>No participating schools</td>
<td>9</td>
<td>12</td>
<td>+3</td>
</tr>
<tr>
<td>No learners who wrote 2nd round</td>
<td>8</td>
<td>13</td>
<td>+5</td>
</tr>
<tr>
<td>No participating schools</td>
<td>3</td>
<td>5</td>
<td>+2</td>
</tr>
</tbody>
</table>
National Buzz (public awareness) by distance

- Website, Facebook & e-mail newsletter subscribers
- Public engagement invitations increasing
  - Press (e.g. M&G & Grocott’s articles)
  - Radio interviews (NRF Science for Society lecture + 2 SAFM shorter inserts + 2 local radio interviews)
  - Television (SABC 2 interview)
  - Local Rhodes i-TV (panel discussion)
South African Numeracy Chair (SANC) Project

We are a hub of mathematical activity, passion & innovation that blends teacher & learner numeracy development with research in mathematics education in Grahamstown and South Africa.

Within the Chair endeavour, our key projects include:
- NICLE teacher development programme
- Starting After School Maths Clubs and Resources
- Homework Drive
- Grahamstown Numeracy Buzz: Family events, SciFest etc

Community of Practice
The Chair participates in an annual Community of Practice forum. Latest presentation: COP Presentation 2013

Latest SANC News
Read more on Archive page
- Steve Lerman's lecture slides and Steve Lerman Vygotsky talk transcription July 2014
- Prof Graven was invited to participate as a role model and mentor in the DST-NRF Research Career Advancement Fellowships Launch, which took place in Cape Town yesterday. Mellony hosted a table which focused on "Strategising Ways In Which Career Advancement And Societal Responsibilities Can Support Each Other".
- June NICLE session focused on teaching and learning measurement. Read more
The transcription for Steve Lerman's talk on Vygotsky can be downloaded from this link:
Research

Two parallel and interconnected aspects of the research.

1. Researching innovative, sustainable and practical solutions to the challenges of numeracy education.

2. Ongoing monitoring and evaluation of the program’s effectiveness on teacher practice and learner performance.

<table>
<thead>
<tr>
<th>In depth post graduate research studies</th>
<th>Evaluation and impact</th>
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<tbody>
<tr>
<td><strong>8 doctoral studies</strong></td>
<td><strong>30 indicators</strong></td>
</tr>
<tr>
<td>(2 teacher learning – PP; RM)</td>
<td>Learner proficiency – 4 instruments/ extent workbook activity/ homework participation teacher knowledge/ practice/ time on numeracy/ confidence research publications/ presentations/ non research products</td>
</tr>
<tr>
<td>(3 clubs – student learning – recovery DS; GP; TW)</td>
<td></td>
</tr>
<tr>
<td>(2 classroom research – SN; SR + language focus)</td>
<td></td>
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<tr>
<td>(1 learner experiences ANAs – language)</td>
<td></td>
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<tr>
<td><strong>9 Masters studies</strong></td>
<td></td>
</tr>
<tr>
<td>(6 club learning – OK; AS; DH; RM; SN; ZM; AW – different foci)</td>
<td></td>
</tr>
<tr>
<td>(2 classroom teaching practices Gr 0/ Gr 1 &amp; Gr 3 language interface)</td>
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The indicator data... make a strong case for the finding that this is a successful programme that SANC, Rhodes University, funders and all stakeholders should be proud of.

This programme is meeting an urgent need in Eastern Cape schools, for the community and government. It is making a difference to educators’ teaching abilities and habits which, in turn, is improving learner performance. Upward trends in both educator and learner results are encouraging.
SANCP’s specific strengths noted:
(points to development of strong team)

- Energetic, motivated, strong leadership and administration.
- Ability to build trusting relationships with schools and educators through compassionate, responsive and respectful approach. Successful transfer of the ethos of "fun" to numeracy educators...
- (NICLE) successfully meets the objectives of a COP; creating a safe space and a needed support system for educators
- Growing a well-received community outreach program that is improving the relationship between Rhodes University and the surrounding schools.
- Building in-roads to parents, engaging them more in their children's' numeracy activities.
- Effective development and distribution of relevant, inexpensive, user-friendly activities, many of which that can be easily reproduced and adapted to meet different ability levels.
- Strategic modification to the program's original Theory of Change to include direct learner interventions to further impact learner results.
- Systematic and effective M&E and Information Management.
* Upward trends - schools with full Gr 3 & 4 teacher participation & relative stability

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<thead>
<tr>
<th></th>
<th>2011</th>
<th>2014</th>
<th>Improvement</th>
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<tbody>
<tr>
<td>SM</td>
<td>46</td>
<td>52</td>
<td>+ 6%</td>
</tr>
<tr>
<td>NM</td>
<td>40</td>
<td>56</td>
<td>+ 16%</td>
</tr>
<tr>
<td>HK</td>
<td>41</td>
<td>53</td>
<td>+ 12%</td>
</tr>
<tr>
<td>KP</td>
<td>79</td>
<td>80</td>
<td>+ 1%</td>
</tr>
<tr>
<td>BP</td>
<td>35</td>
<td>40</td>
<td>+ 5%</td>
</tr>
</tbody>
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(+ve trends but differential improvements)

(2011) 50.3% - (2014) 52.4%
Alexandria school protests over posts

STRUGGLE songs and placards were the order of the day as more than 200 pupils and parents protested outside Alexandria High School in the town yesterday over teacher shortages.

The school, which has more than 350 pupils, has been operating with vacant posts for longer than four years, according to some of the teachers and parents.

Principal Aldworth Meyer said the school was experiencing problems faced by most schools in the province – the filling of teacher posts.

“We have six vacant posts at the school, two of which are promotional posts and these promotional posts will have to be [filled] following procedure,” Meyer said.

Grade 9 pupil Losimphiwe Wanisa, 14, accused Meyer of favouring matriculants over the rest of the pupils in terms of allocating teachers.

“When we arrive at the school, we’re told to sit in the hall, while the matriculants are taught by teachers. I also want to be taught, because I do not want to fail or be a year behind my peers because my school didn’t have enough teachers.” – Nomazima Nkosi
Parents close primary school

MALIBONGWE DAYIMANI

Angry parents accompanied by members of the School Governing Body George Dickerson Primary school locked down the school yard in an effort to send a message to the Department of Education.

The school was closed on the first day of school.

Chairperson of the School Governing Body Berend Pat-Walters said the school only has 18 active teachers for 40 pupils. The school teaches from Grade R to Grade 3. Grade comprises three classes of 40 pupils each.

Principal Mike Melville said the school has 20 staff members in total, but that two were on extended sick leave. The Department granted us leave for 10 of our teachers, meaning we have 22 staff members. But the posts were not filled,

Walters said the school was underfunded and had been neglected by the government.

The school has 31 schools in the Eastern Cape affected.

According to the LRC website the number of teachers involved in the class action currently stands at 150 and they are owed up to R25 million. “The government always complains about poor matric results but they fail to invest at this critical foundation phase,” Walters said.

Walters said he is worried that the situation at the school will lead to disastrous matric results.

The Legal Resources Centre in a class action law suit against the Eastern Cape Department of Education.

Meiring said the department owes the school well over R80 000. He said the school was paying four teachers from their own reserves, through school fees.

The Legal Resources Centre is currently negotiating with the Department to reimburse schools including George Dickerson and others in the same situation. Around 31 schools in the Eastern Cape are affected.

According to the LRC website the number of teachers involved in the class action currently stands at 150 and they are owed up to R25 million. “The government always complains about poor matric results but they fail to invest at this critical foundation phase,” Walters said.

Walters said he is worried that the situation at the school will lead to disastrous matric results.

cover for the dwindling number of teachers at his school. He barely had time for administrative work, he told Grocott's Mail. Walters said the shortage of teachers meant there was poor supervision of the children at school.

“Because there is no one looking over these children, some are becoming wild and fight against each other,” Walters said.

When Grocott's Mail called the district office of the Department of Education for comment, reporters were told that senior officials were busy in a workshop.

Making the situation worse, said Walters, was the fact that two teachers at the school had been on sick leave for a combined period of seven years, while still continuing to get paid full salaries every month.

“One of them has been on sick leave for over six years and another for over a year,” Walters said.

*Now read Parents demand for compensation for teachers who have been on sick leave for years.
Minor drops but cohort growth (Gr3-4)

- Minor drops where instability of: teachers, grade taught; class sizes & changing demographics
  - AH: 43 → 42 -1%
  - SP: 79 → 77 -2%
  - AP: 43 → 41 -2%

- But still see upward trends in growth in cohorts
  - E.g. AH: 2011 to 2012 +3% 2013 to 2014 + 8.3%
  - SP: 2011 to 2012 +11.67% 2013 to 2014 21%
  - But AP mixed (+13.7; +7.6; +11.2)
GP - teachers attending are Gr 2 & Gr 5. Grade 4 teacher is the principal (45% to 32%).

GD - school has become increasingly dysfunctional, protests, 2 grade 4 classes without a teacher, couldn’t gather all data.

OP - only FP school at start i.e. no Gr 4 data to follow through with.
Research: Full time research community

Peter PhD-submitted

Debbie PhD-submitted

Lucy PhD

Roxanne Masters by thesis
Part time research community

Doctoral students

- Roger Meterlerkamp
- Sally-Ann Robertson
- Siviwe Ndongeni
- Tania Wait
- Gaye Pieterse

Masters students

- Anelia Wasserman
- Melissa Spira
- Gasenakeletso Hebe
- Sandisiwe Dial
  Final Year Research Assistant
All research students are supported to present and publish work (post 1st yr)

- 10 peer reviewed journal publications
- 5 professional journal publications
- 3 press articles
- 23 conference/ workshop presentations (19 with proceedings)
<table>
<thead>
<tr>
<th>Area of research</th>
<th>Authors</th>
<th>Accredited Publications</th>
<th>Keywords</th>
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<tbody>
<tr>
<td>Mathematical Proficiency</td>
<td>Stott; Mofu; Ndongeni; Graven</td>
<td>Perspectives AMESA Pythagoras SAARMSTE</td>
<td>Fluency spectrums Progression (levels) Strands of proficiency</td>
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<tr>
<td>Learner Progress &amp; Mathematical recovery</td>
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<tr>
<td>Primary Maths Teacher</td>
<td>Pausigere; Graven</td>
<td>Perspectives Education as Change AMESA SAARMSTE</td>
<td>Community of Practice Identity - PMTI Learning metaphors stelos</td>
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<td>Identities &amp; learning</td>
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<tr>
<td>Language &amp; learning/assessment</td>
<td>Sibanda; Robertson; Graven (Venkat collaborator)</td>
<td>SAJCE AJRMSTE (submitted) SAARMSTE</td>
<td></td>
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<tr>
<td>Learning dispositions, forms of participation &amp; equity</td>
<td>Graven; Hewana; Stott; Heyd-Metzuyanim key collaborator</td>
<td>SAJCE AJRMSTE ZDM Jnal of SciEd SAARMSTE ESM (in process)</td>
<td>PD, sense making, steady effort, self efficacy, resilience, resourcefulness, reciprocity, SES</td>
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<tr>
<td>Nature of learning: ZPD &amp; Mediation</td>
<td>Stott; Kaulinge; Graven; Lerman (key collaborator)</td>
<td>Pythagoras FLM AMESA Education as Change (submitted)</td>
<td>ZPD, Zone Theory, Club design</td>
</tr>
</tbody>
</table>
• Quality of research projects and findings can’t be captured in such a COP presentation. web page - all theses and peer reviewed publications
• Increasing pressure on teachers by department to submit documents, forms, files, marks etc. (form vs function)
• the more functional the school - the greater the pressure
• Anecdotes from teachers extremely concerning - increasingly impacting teaching time
• How do we intervene systemically?
We have a fantastically committed team and we love the work we do.

On behalf of the entire Chair team, I thank all at this COP forum and all our funders and Rhodes University for the support we receive to do this work.

www.ru.ac.za/sanc