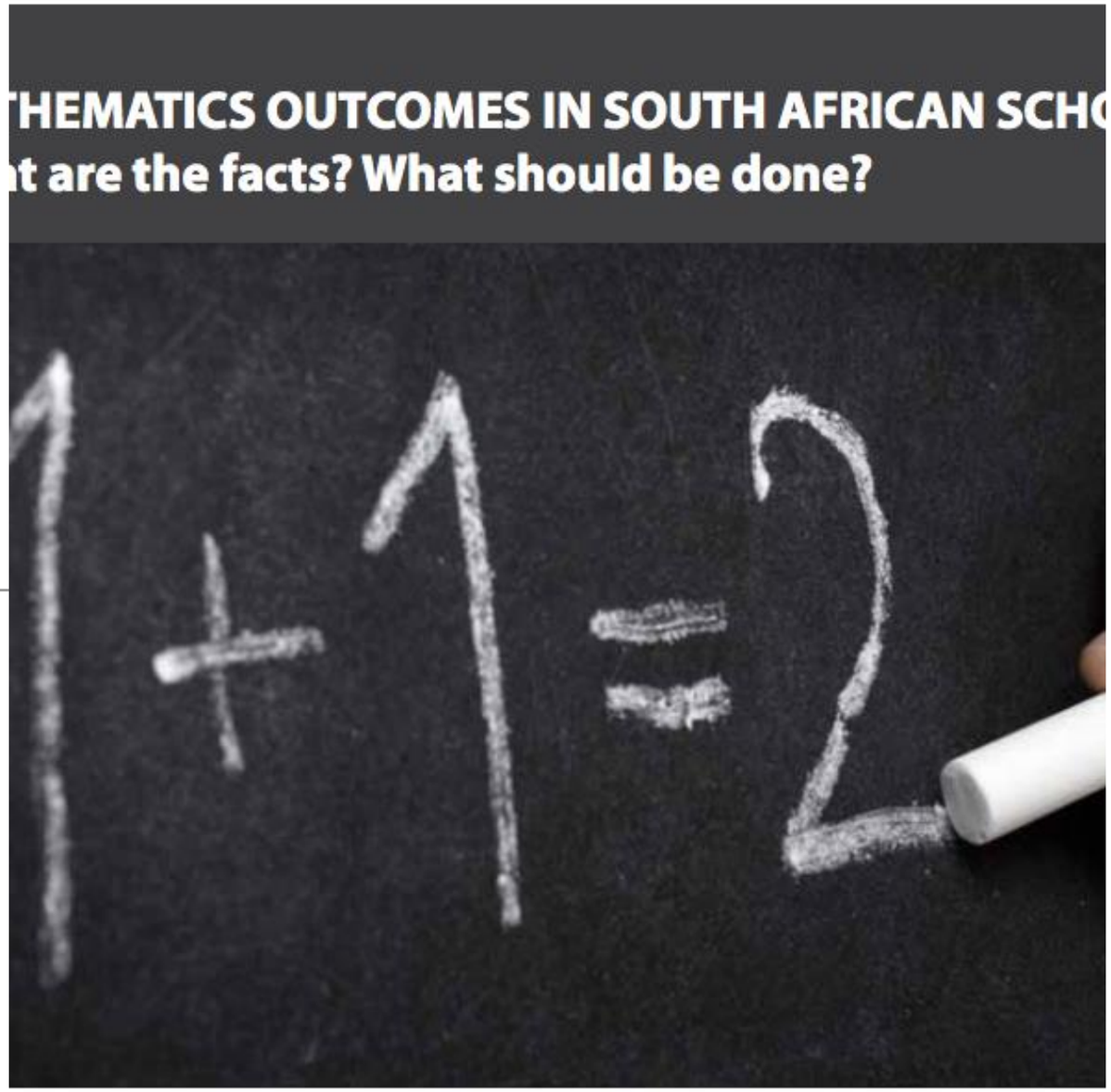
African Institute of Mathematical Sciences:
Schools Enrichment Centre

Marie Joubert, Ingrid Mostert and Barrie Barnard

The crisis with maths education in South Africa

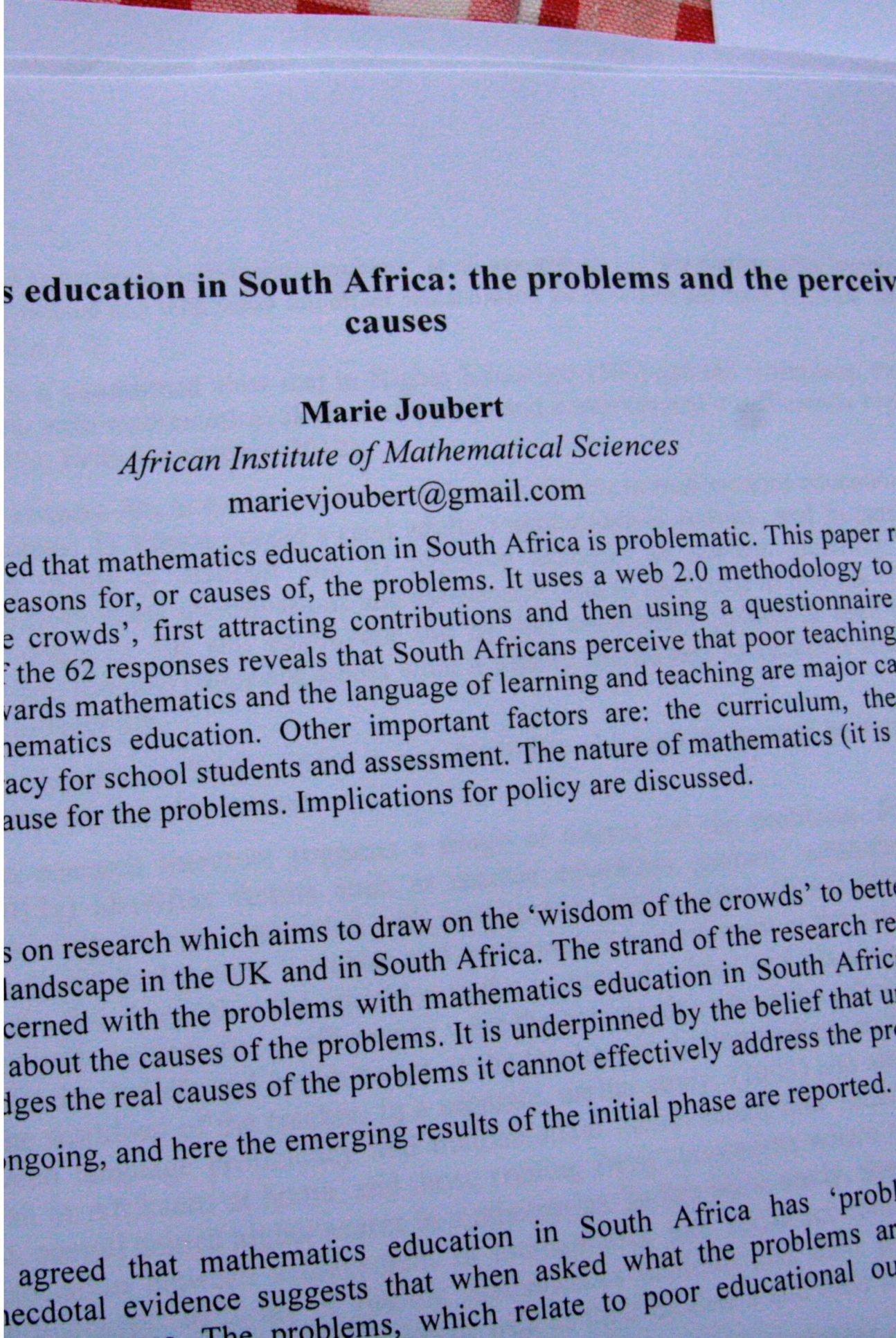
- Education crisis in general
- Mathematics in particular



South Africa is significantly underperforming in education, particularly mathematics teaching and learning. Mathematics teaching is often poor quality, with teachers not able to answer questions in the curriculum they are teaching, one indicator of the challenge. Often national testing is misleading as it does not show the major gap at lower grade levels. Of the full complement of pupils who start school, only 50 per cent will make it to Grade 12 and only 12 per cent will qualify for university entrance. Fundamental reforms are needed in

The causes of the problems

- Research
- A paper for SAARMSTE



s education in South Africa: the problems and the perceiv
causes

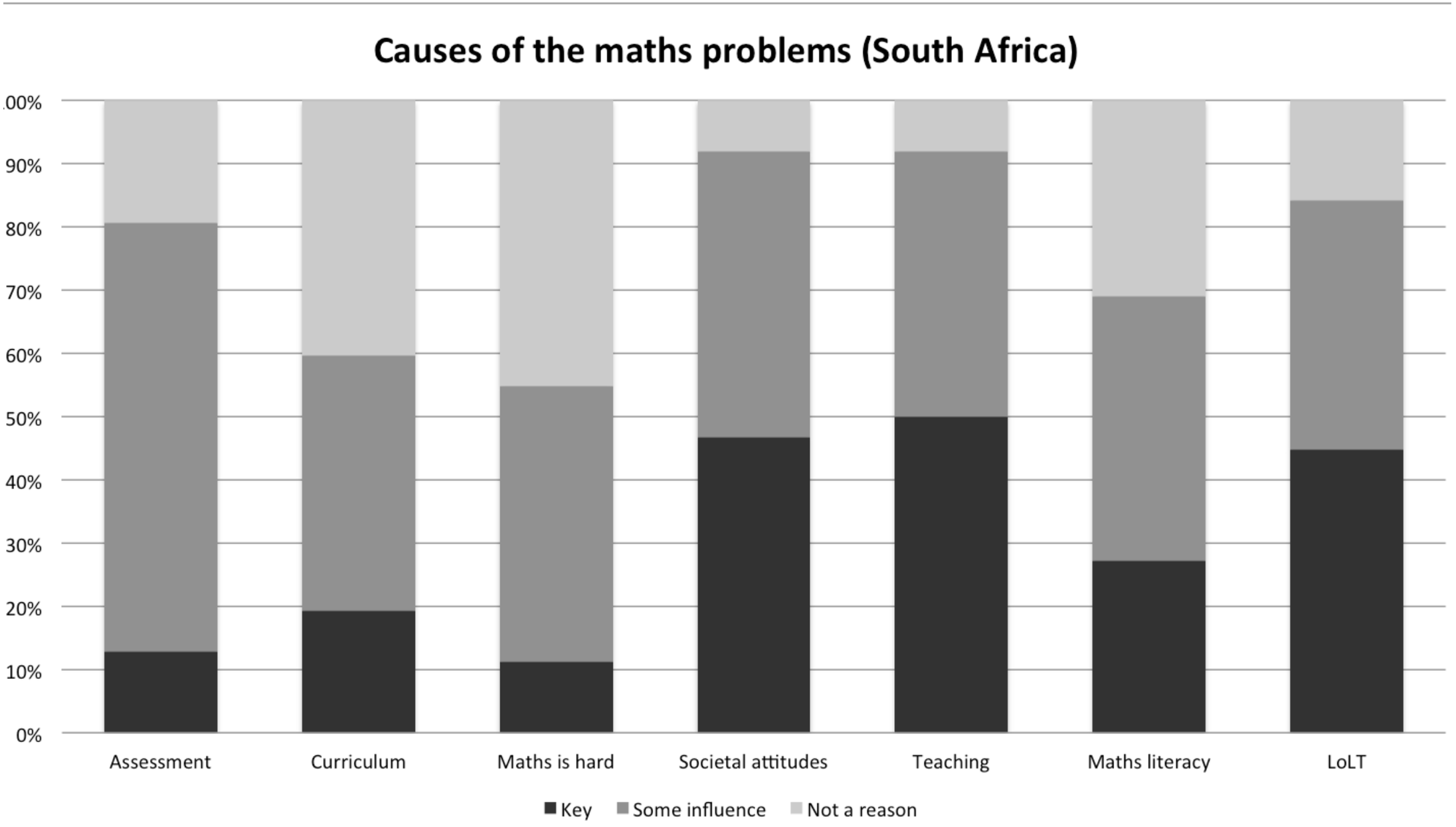
Marie Joubert
African Institute of Mathematical Sciences
marievjoubert@gmail.com

ed that mathematics education in South Africa is problematic. This paper r
easons for, or causes of, the problems. It uses a web 2.0 methodology to
e crowds', first attracting contributions and then using a questionnaire
the 62 responses reveals that South Africans perceive that poor teaching
vards mathematics and the language of learning and teaching are major ca
nematics education. Other important factors are: the curriculum, the
acy for school students and assessment. The nature of mathematics (it is
ause for the problems. Implications for policy are discussed.

s on research which aims to draw on the 'wisdom of the crowds' to bett
landscape in the UK and in South Africa. The strand of the research re
cerned with the problems with mathematics education in South Afric
about the causes of the problems. It is underpinned by the belief that u
dges the real causes of the problems it cannot effectively address the pr

ngoing, and here the emerging results of the initial phase are reported.

agreed that mathematics education in South Africa has 'probl
necdotal evidence suggests that when asked what the problems ar

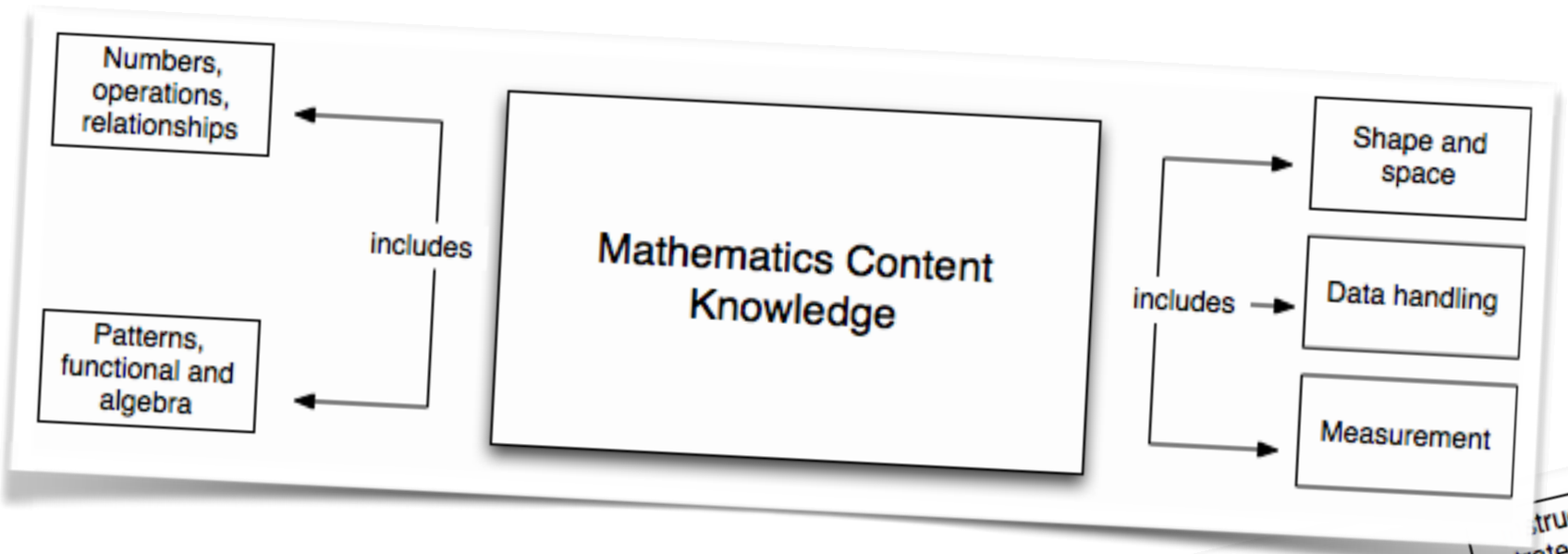


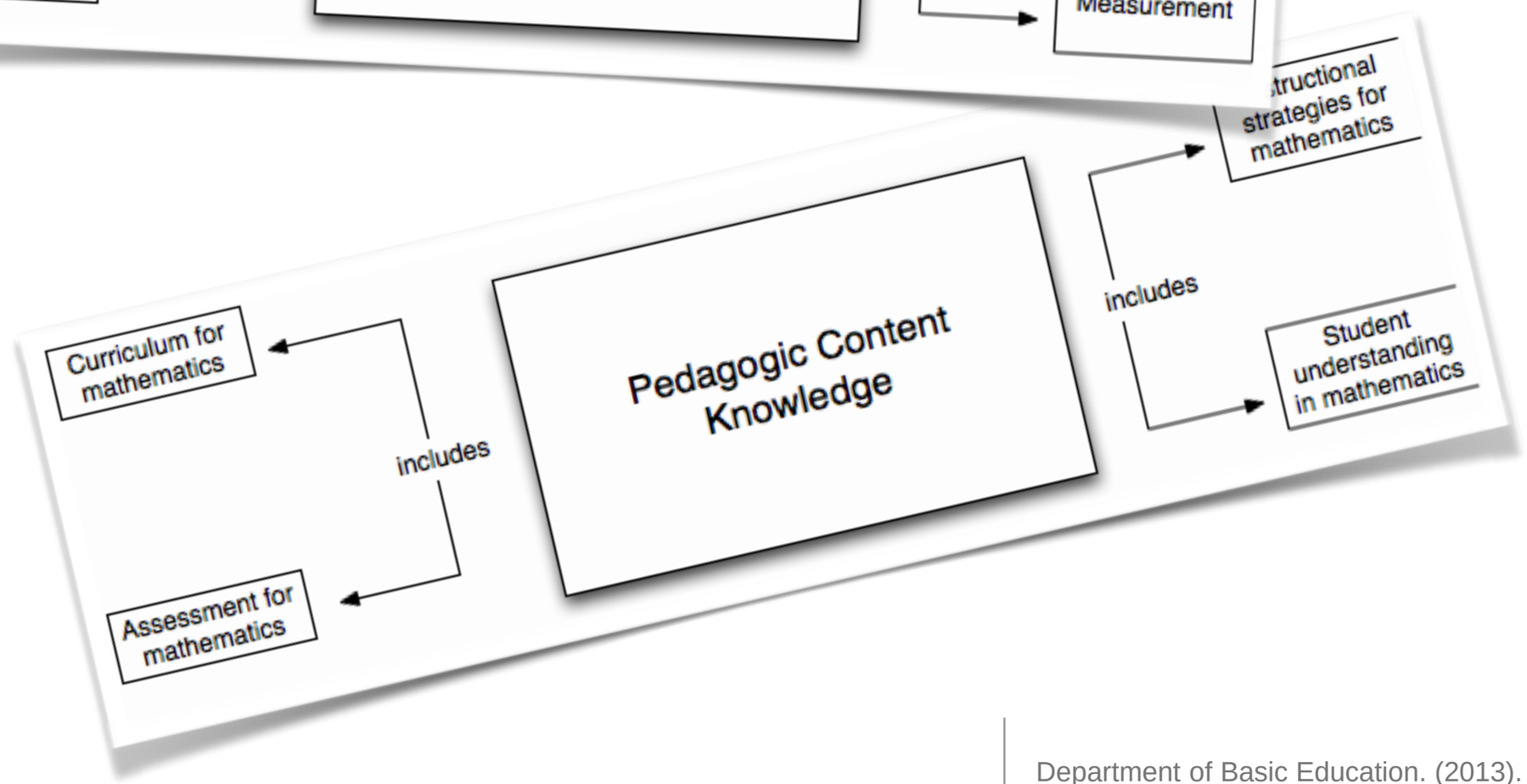
Analysis

Teaching - a key cause?

A need for professional development

- Improving teacher knowledge
- What teacher knowledge?





Teacher knowledge

Department of Basic Education. (2013). Curriculum and Assessment Policy Statement (CAPS) Grade 7 to 9. Pretoria.

Lannin, J. K., Webb, M., Chval, K., Arbaugh, F., Hicks, S., Taylor, C., & Bruton, R. (2013). The development of beginning mathematics teacher pedagogical content knowledge. Journal of Mathematics Teacher Education, 16(6), 403–426. doi:10.1007/s10857-013-9244-5

AIMSSEC

- Teacher education
- … capacity building
- Complements existing provision

AIMSSEC

African Institute for Mathematical Sciences
Schools Enrichment Centre

A model of professional development

- Blended learning
- Cascading into schools
- Communities of practice
- Embedded in the everyday context

- Mathematics
- Pedagogy
- Enquiry

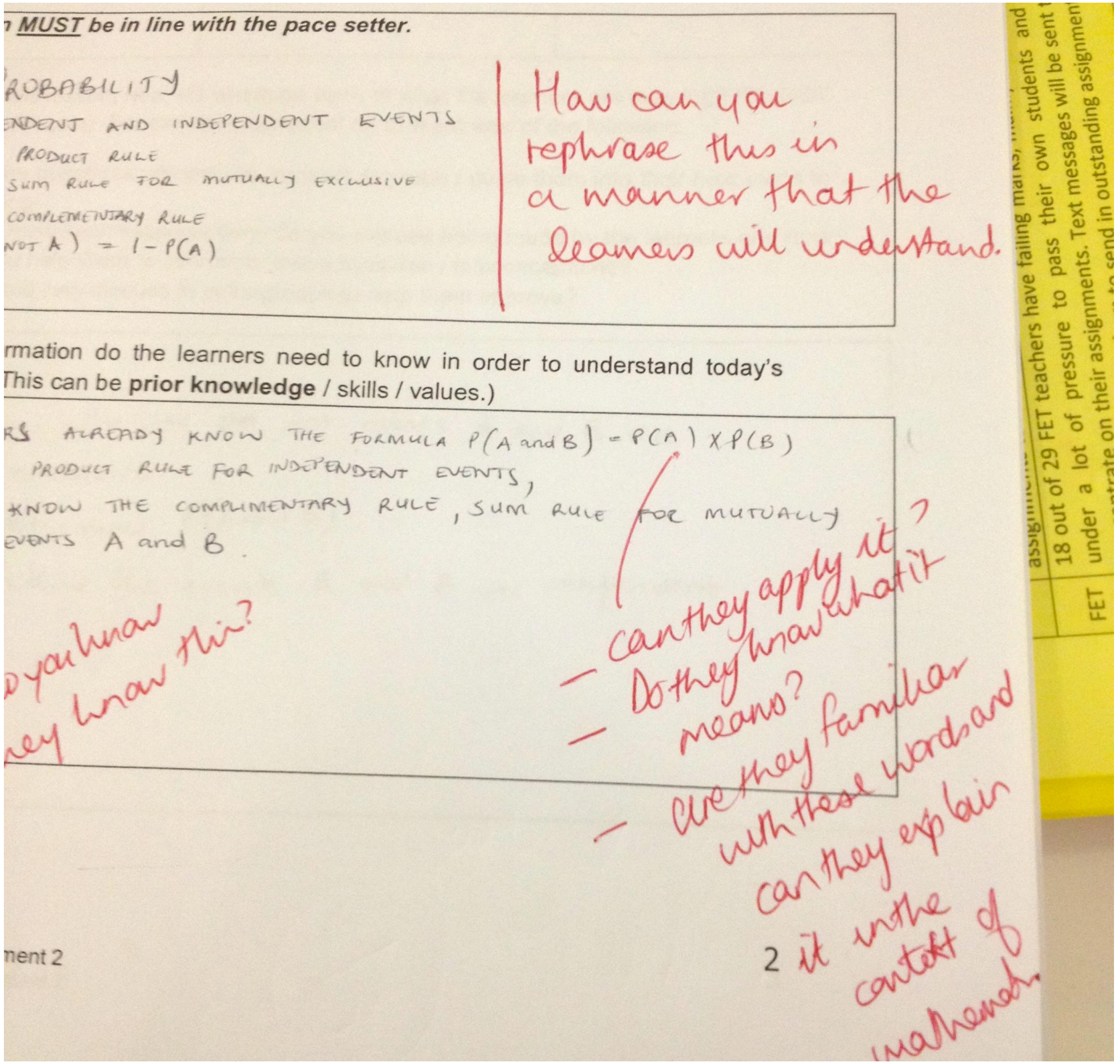
Residential courses

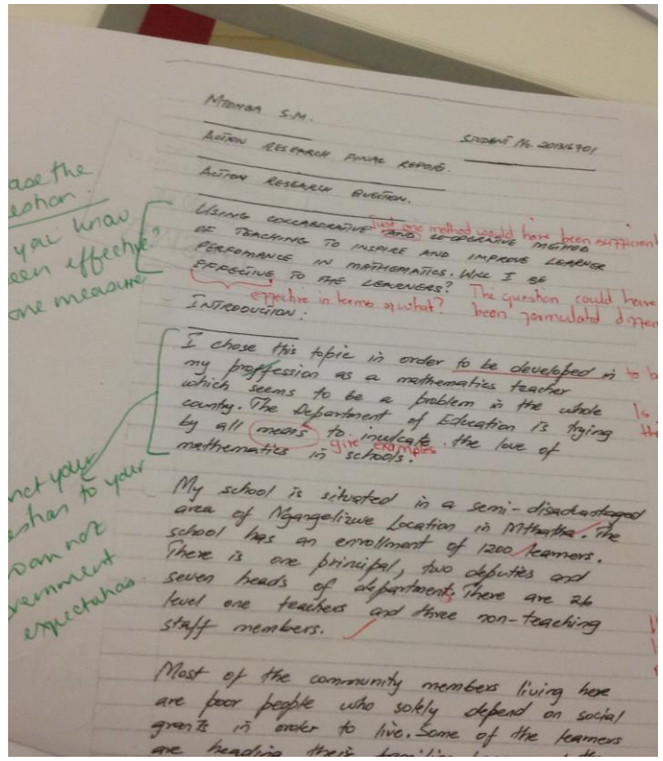
Then they go home

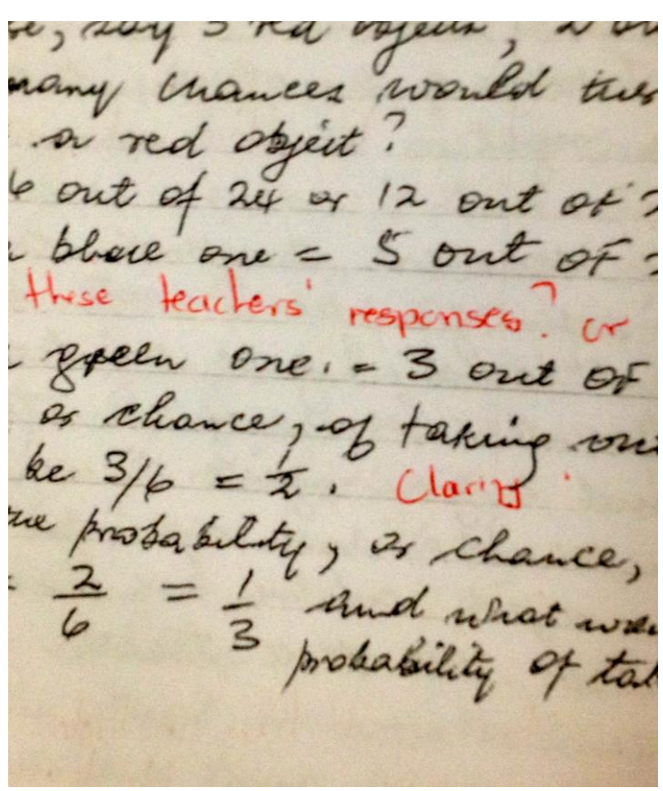
- Applying what you learned: plan, teach, review
- Mathematics
- Teaching and learning environments
- Workshops for colleagues
- Action research

AIMSSEC's role

- Planning and running residential courses
- Mentoring, support, guidance
- Marking and feedback







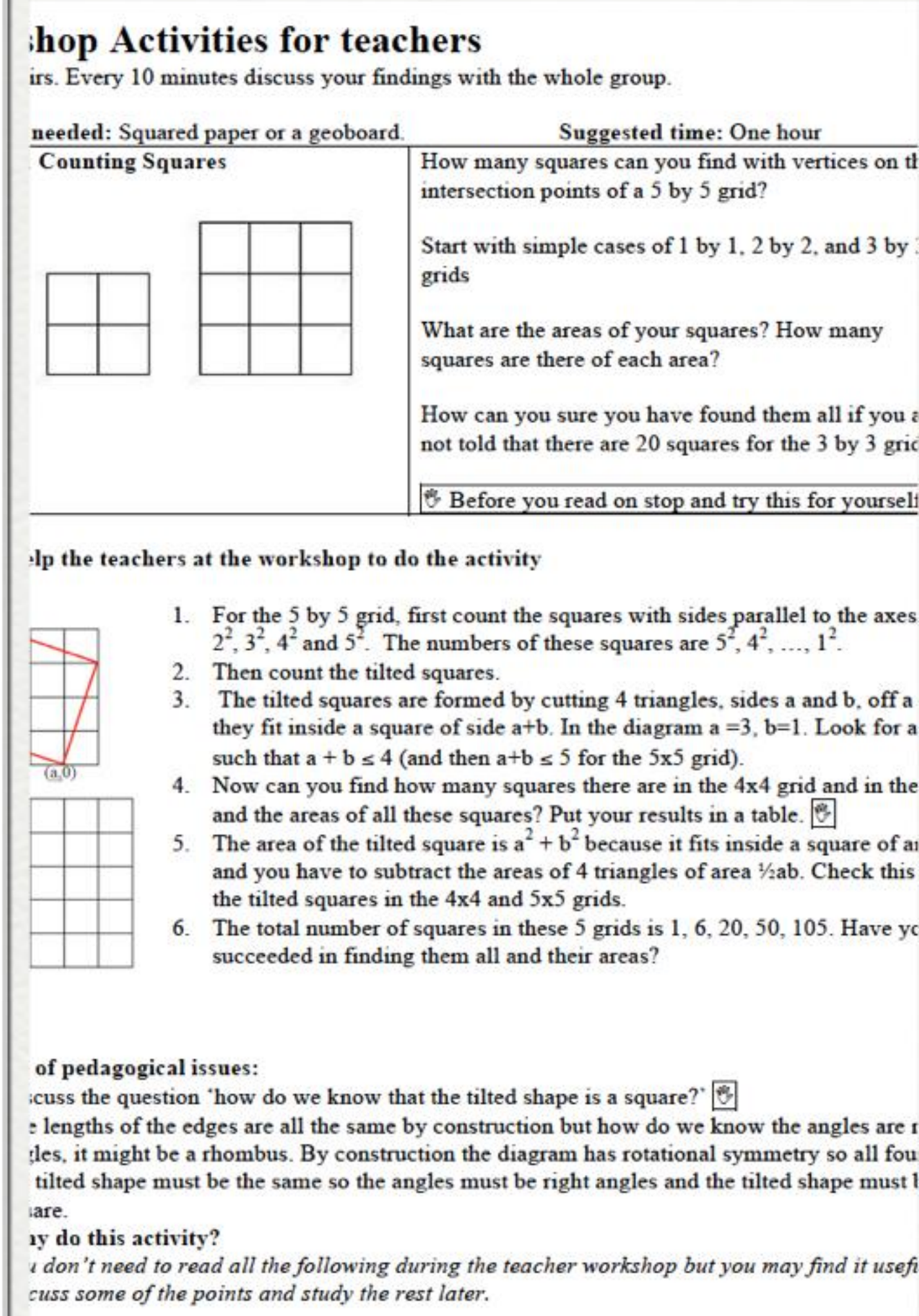
Marking, feedback and formative assessment

An aside: different kinds of assessment

- Gathering information about your students' current levels of understanding
- What do you do then?
- Summative assessment, formative assessment

Striving for excellence

- Designing teaching
- Designing resources
- Developing a learning community
- Research



hop Activities for teachers

irs. Every 10 minutes discuss your findings with the whole group.

needed: Squared paper or a geoboard. **Suggested time:** One hour

Counting Squares

How many squares can you find with vertices on th intersection points of a 5 by 5 grid?

Start with simple cases of 1 by 1, 2 by 2, and 3 by grids

What are the areas of your squares? How many squares are there of each area?

How can you sure you have found them all if you a not told that there are 20 squares for the 3 by 3 grid

Before you read on stop and try this for yourself

lp the teachers at the workshop to do the activity

(a,0)

1. For the 5 by 5 grid, first count the squares with sides parallel to the axes 2^2, 3^2, 4^2 and 5^2. The numbers of these squares are 5^2, 4^2, …, 1^2.
2. Then count the tilted squares.
3. The tilted squares are formed by cutting 4 triangles, sides a and b, off a they fit inside a square of side a+b. In the diagram a =3, b=1. Look for a such that $a + b \le 4$ (and then $a+b \le 5$ for the 5x5 grid).
4. Now can you find how many squares there are in the 4x4 grid and in the and the areas of all these squares? Put your results in a table.
5. The area of the tilted square is $a^2 + b^2$ because it fits inside a square of a and you have to subtract the areas of 4 triangles of area ½ab. Check this the tilted squares in the 4x4 and 5x5 grids.
6. The total number of squares in these 5 grids is 1, 6, 20, 50, 105. Have yo succeeded in finding them all and their areas?

of pedagogical issues:

cuss the question 'how do we know that the tilted shape is a square?'

e lengths of the edges are all the same by construction but how do we know the angles are r gles, it might be a rhombus. By construction the diagram has rotational symmetry so all fou tilted shape must be the same so the angles must be right angles and the tilted shape must b are.

ıy do this activity?

ı don't need to read all the following during the teacher workshop but you may find it usefi cuss some of the points and study the rest later.

Research

- Formative Assessment in Science and Mathematics Education (FaSMEd)
- European Union project
- Eight partners in Europe
- … and AIMSSEC

FaSMEd's work

- Improving classroom formative assessment
- Design research: a toolkit for teachers
- Interventions and case studies
- Workshops

MAY 8, 2014

Welcome

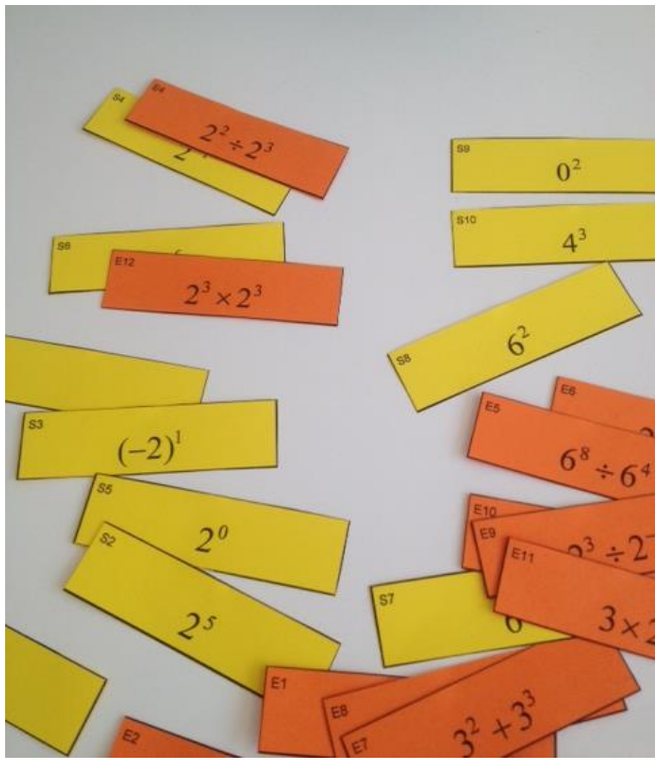
This is the blog for the FaSMEd project at the African Institute for Mathematical Sciences (Schools Enrichment Centre).

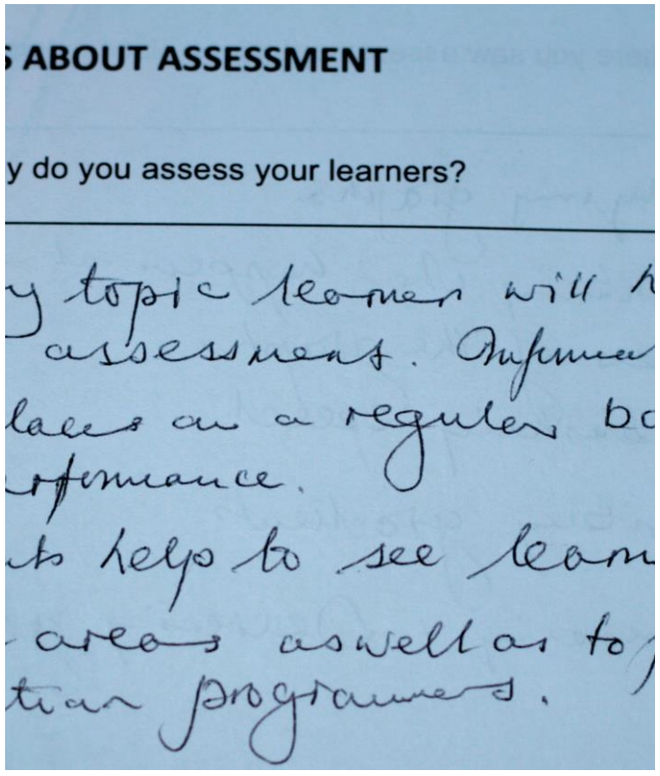
The blog is intended as a first dissemination tool, open to anyone to read and comment on. The blog includes:

- What the project is about
- Discussions about some of the questions we are grappling with (e.g. what do we know about toolkits for teachers' professional development?)

The FaSMEd blog

General information





Workshops, baseline research, outreach, working with teachers

FaSMEd Toolkit

A toolkit to support formative assessment

HOME THEORY CLASSROOM ACTIVITIES PROFESSIONAL DEVELOPMENT RESEARCH

Welcome

SEPTEMBER 16, 2014 ~ LEAVE A COMMENT ~ EDIT

Welcome to the FaSMEd toolkit. This toolkit is still being developed. Some teachers are helping to develop the toolkit by using it, allowing us to observe them using it, giving us their feedback and advising us. The toolkit includes five sections:

International toolkit

Next steps for FaSMEd

- Working with teachers: toolkit
- Visiting schools
- Further research on toolkits

The end