



AIMS

African Institute for
Mathematical Sciences
SCHOOLS ENRICHMENT CENTRE



FaSMEd

Design research:
Designing a garden

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FAOIMED: a quick overview

- Formative assessment (Fa)
- In science and maths (SM) education (Ed)
 - A three year research project
 - Funded by the European Union
 - Involves nine partners

What we do

- Nine workpackages (WP)
- WP 3 - design a toolkit



- WP 4 - classroom interventions



Theoretical framing

- **Design research for the toolkit**

- try something new
- see what happens
- review and improve
- try again

e.g. Carraher & Schliemann, 2002; Cobb, Confrey, Disessa, Lehrer, & Schauble, 2003; Collins, Joseph, & Bielaczyc, 2009

- **Formative assessment**

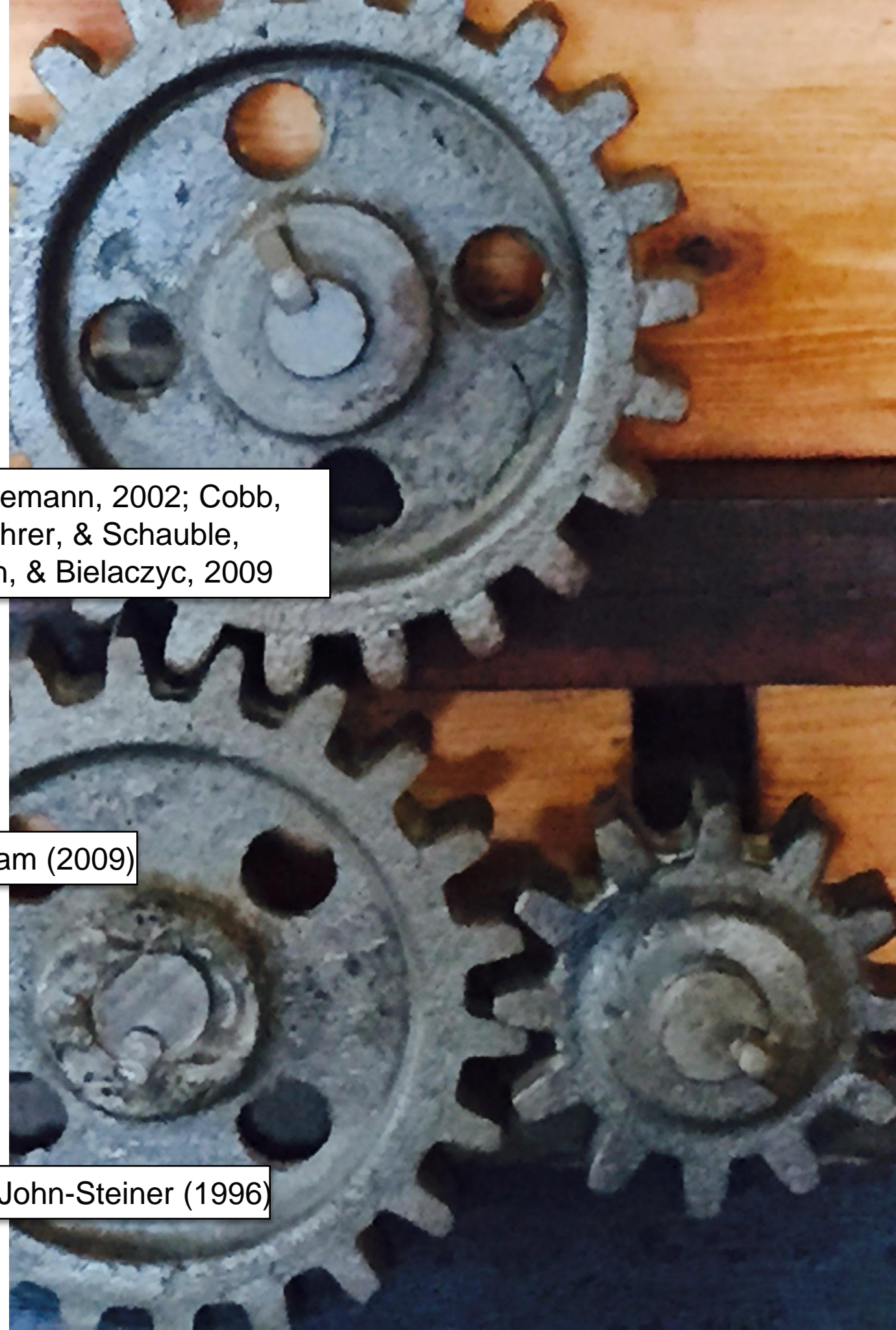
- gather information about students' understanding
- act accordingly

e.g. Black and Wiliam (2009)

- **Learning theories**

- social constructivism
- creating concepts with others
- as language and tools are used and internalised

e.g. Vygotsky (1978), John-Steiner (1996)



The interventions

- 20 teachers in 10 schools
 - 3 lessons each
 - write up lessons
 - interviews
 - cluster meetings
- February to November 2015
- Try out 'learning experiences' (lessons)
- Small groups
 - discussion
 - formative assessment
 - card sorting or matching
 - OR problem solving



Today's presentation is about one intervention

- The lesson as designed
- The context
- What happened
- What we have learned

Design a Garden



Imagine you are a garden designer.
You receive this email from a customer:

Dear Garden Designer,

I have moved into a house with a small garden that needs a total redesign.
Please design my garden for me. I have attached an accurate scale drawing of my garden to this email. I've listed below some features I want in the garden. I will email you later about some other things I also want.

To start, please could you draw these features accurately on the plan, showing where you think they should go in the garden. Send me your plan with an explanation of your thinking.

Best wishes,

Mandy

Shed

I've ordered this shed. It is 2 meters wide, 3.25 meters long and 2.8 meters tall.



Decking for barbeques

I want some decking near the patio doors.
It should be big enough to seat at least six people.



Circular pond

I would like a circular pond.
I'd like its area to be about 7 m^2 .



Path and Borders

I would like some flower borders. These should not be more than one meter wide as I find wider ones difficult to look after.

I'd like a gravel path 1 meter wide to go from the shed to the house and from the garden gate to the house.

I will cover the rest with grass.

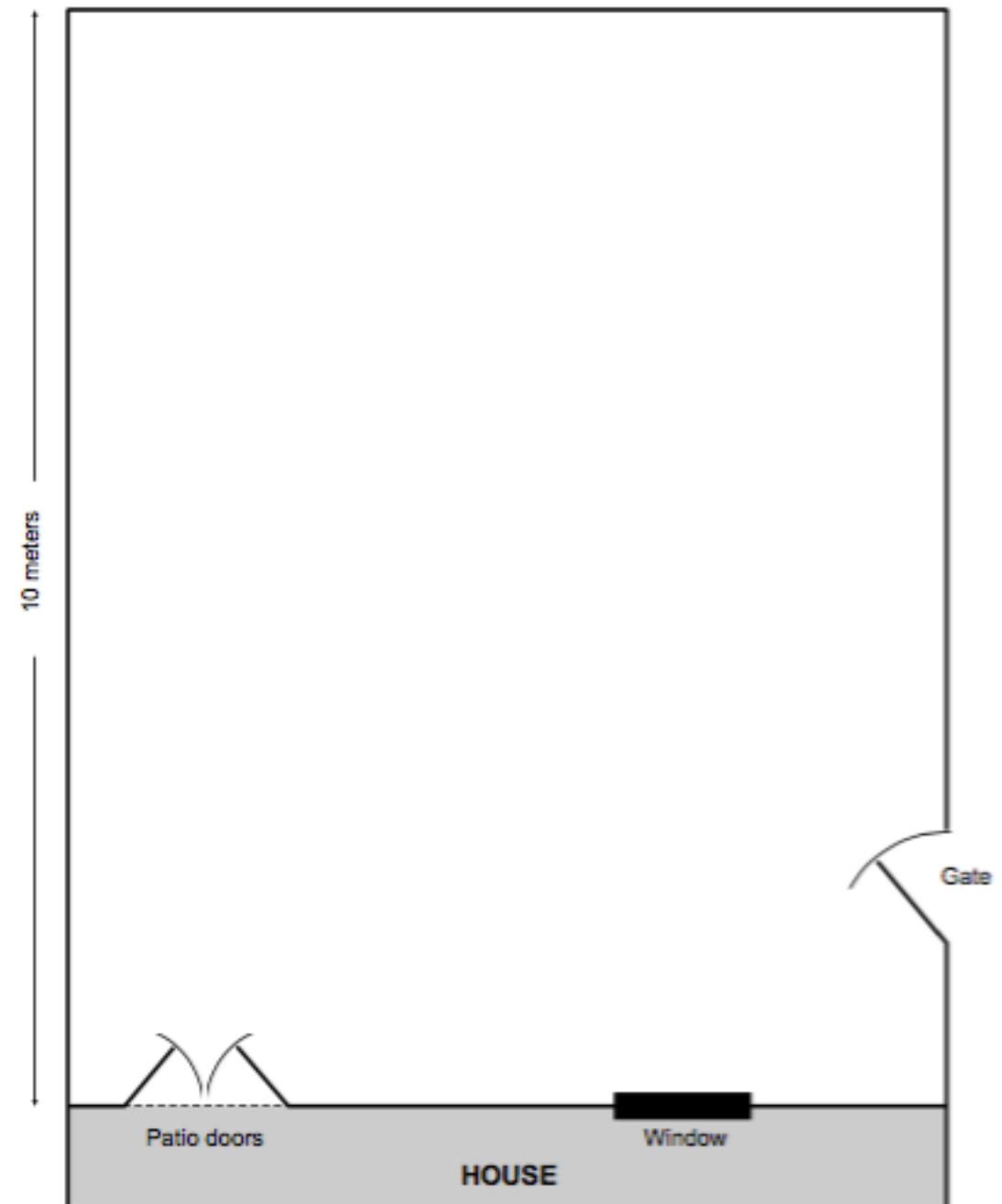


Use the sheet *Garden Plan* to draw the features from the email.

Record all your calculations and reasoning on a separate sheet.

Make sure to record the scale you use on the plan.

Garden Plan



Design a garden

Scale drawings
Ground plans (2D and 3D)
Calculating radius



The world of work

Real-life constraints and
compromises
Collaborating
Many possible solutions

The plan

- Introduce the task - maths and problem solving
- Pair or small group work
- Sharing work

The context

- One TVET college and one school
- The students
 - language of instruction
 - experience
- All maths literacy classes

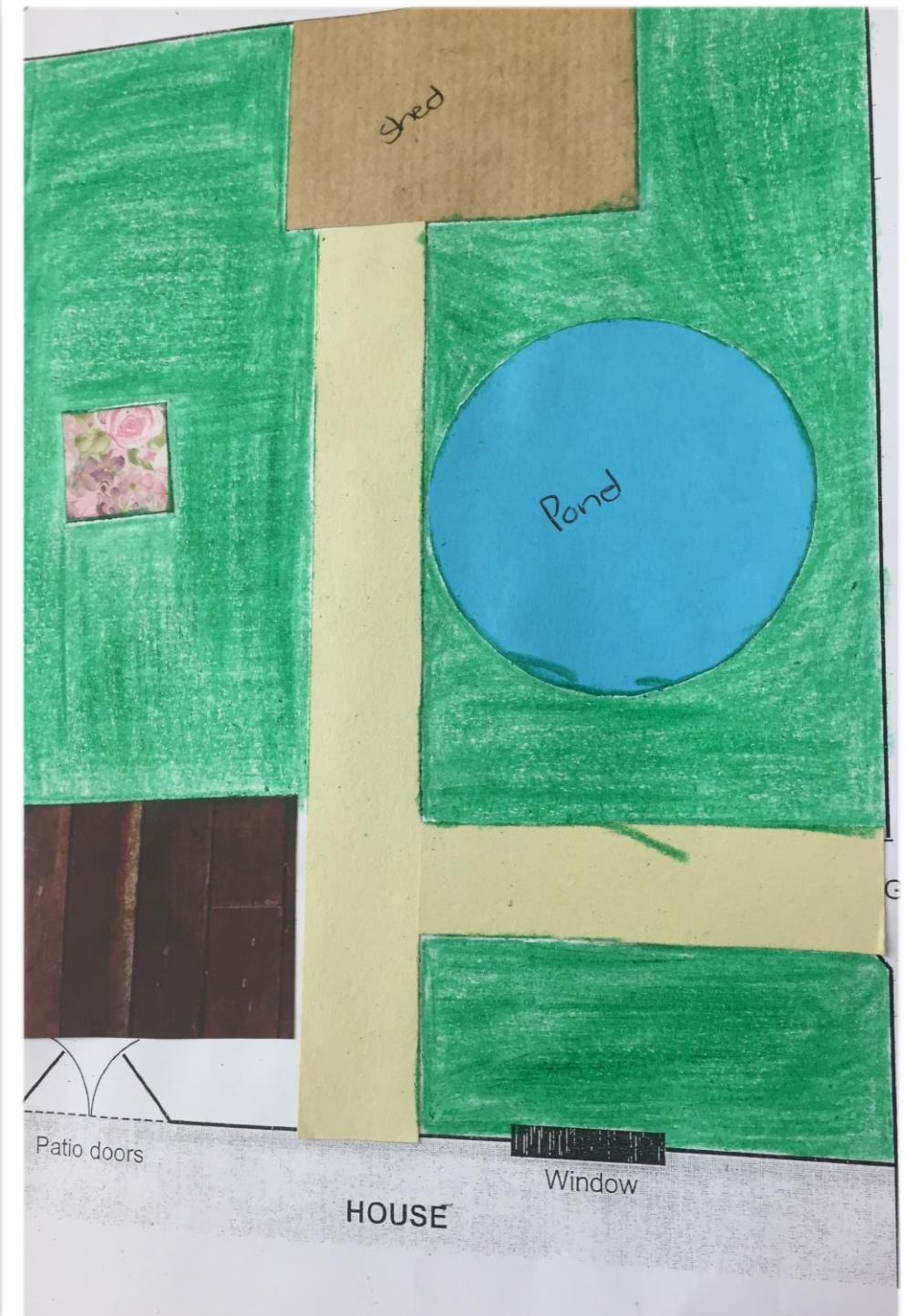


Á priori analysis

- Student readiness (maths, small groups, presenting)
- Teaching
- Epistemological obstacles (Brousseau, 1997)

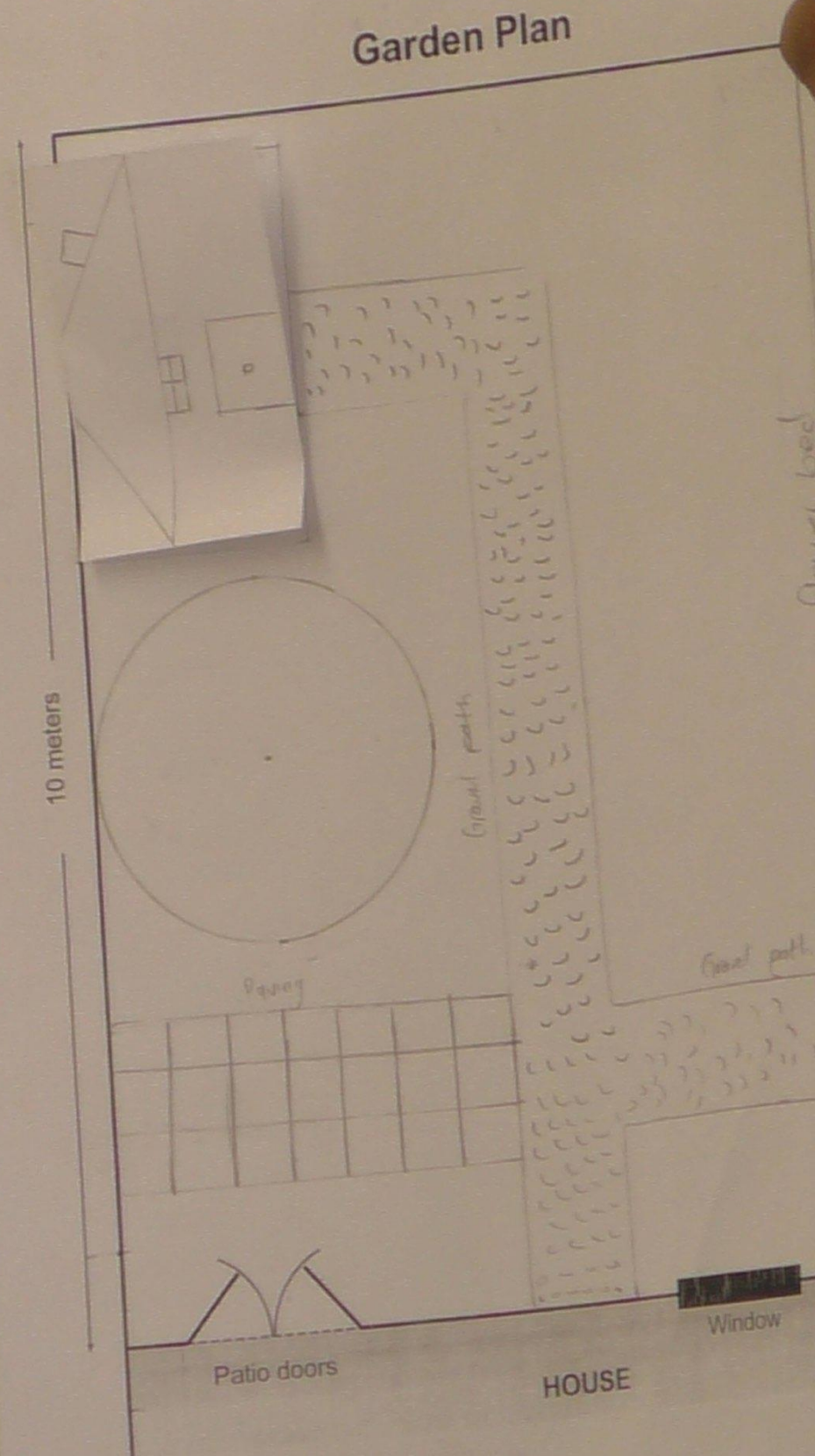
What happened

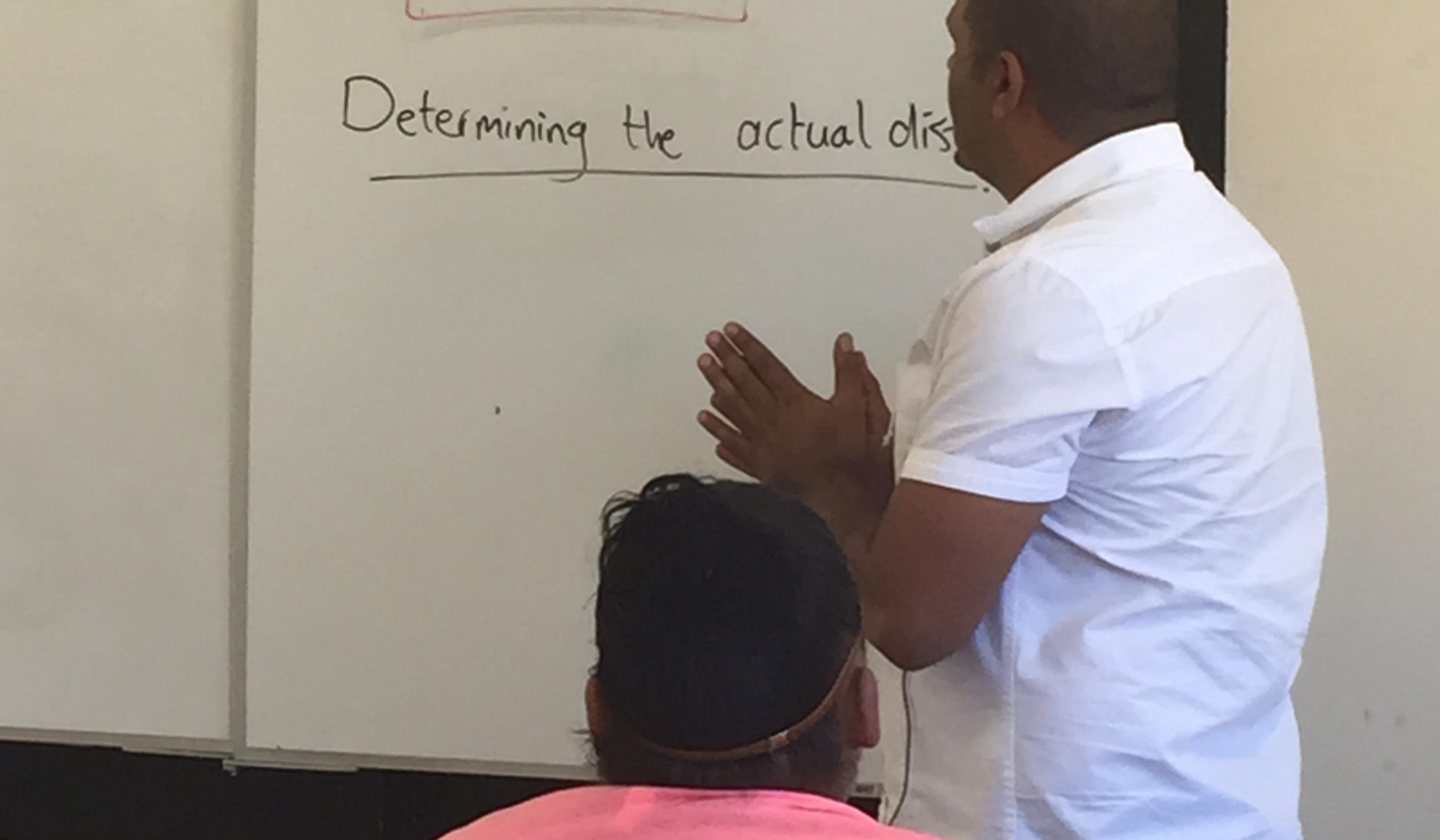
- Three classes at Vredendal
 - planning (paper and glue)
 - lessons learnt during the day
 - big lessons learnt
- One class at Vuyiseka
 - planning



What happened

- Cutting shapes
- Language
- 3-D shed
- Radius of pond





Determining the actual dist

**Introducing the
mathematics**

2D and 3D shapes



Introducing the task

Emphasising real life



What
happened

Struggling to get started



Sharing work

Time

Groups at the front

Individuals explaining



The experience of the teachers

- Doing something different
- Time
- Bird's eye view

made-me-think
group-work
boring easy
confusing
exciting difficult
different
made-us-discuss

Word

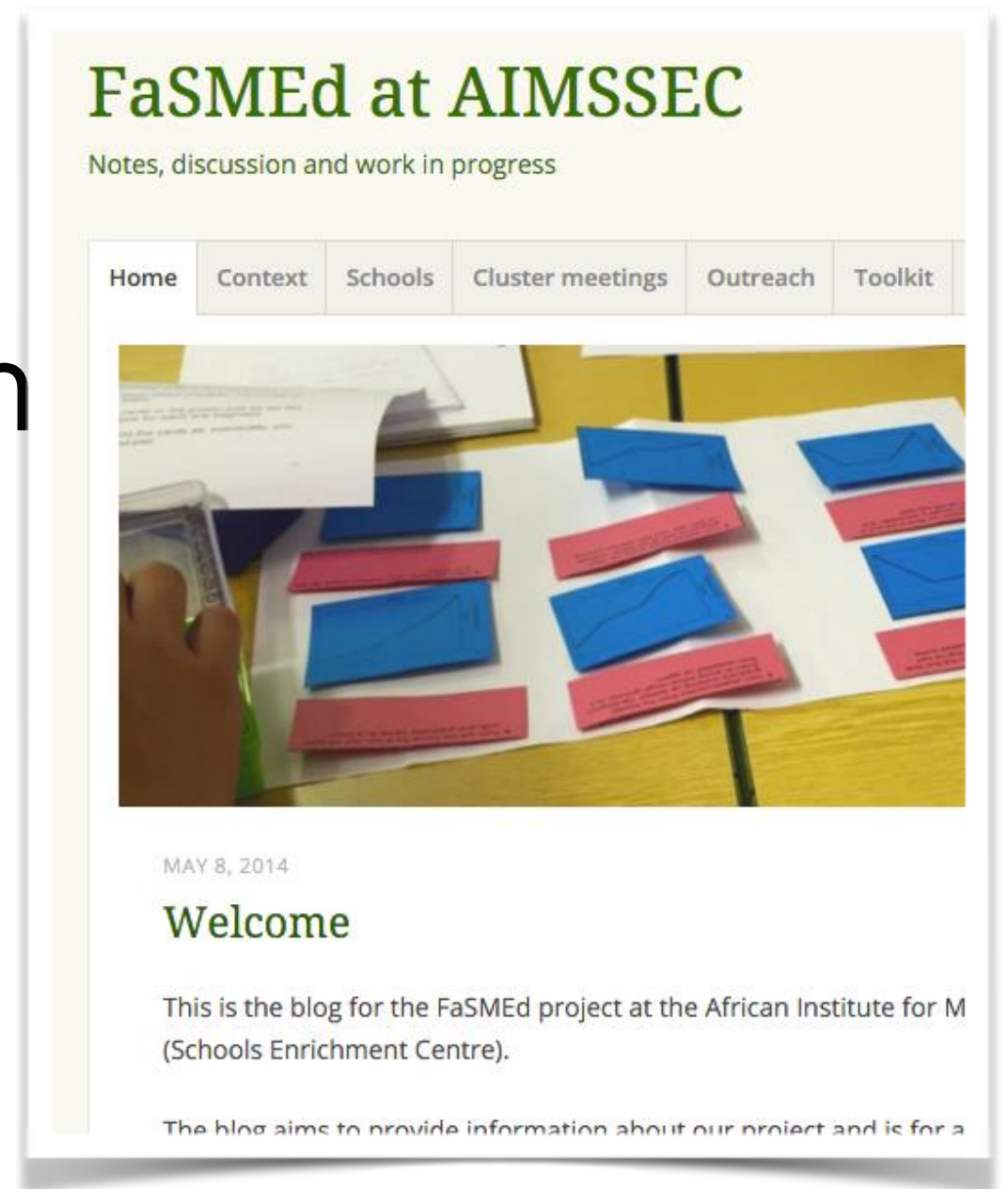
The experience of the
students

Lessons learned for the toolkit

- Language (width)
- Calculating the radius
- Number of constraints

Finishing off

- So what?
- More about FaSMEd in South Africa
- What's up next
- Comments and questions



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