Adult Numeracy Teaching and Learning in Developing Countries: Lessons from Timor-Leste

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This workshop combines:

- Some activities
  - found useful with learners from Timor-Leste
  - hopefully applicable in other developing countries
  - and with LOTE numeracy learners
- Some stories
  - about why they were developed
  - and how they have led to other activities
- Some reflections on my learning whilst teaching in this situation






05
32 837








POLISIA


TASK - FORCE






Charles Darwin
UNIVERSITY
Information
ORIENTATION
CHARLES
DARWIN
UNIVERSITY


Charles Darwin
8



ACTIVITY MODELS – WHAT AND WHY?

- In Australia we have developed and used many innovative adult numeracy teaching methods
  - Games for skills practice
  - Use of hands on materials to teach concepts
  - Pair and group activities
  - Discussion
- Activities from resources provide initial courage to start using new ideas
- It takes even more courage to try these in new situations with adult students from other cultures or in developing countries
- It is worth the effort! They love them.




EQ

Activity model
Guess, estimate & measure

- Metric awareness activity
- Useful, effective & enjoyable in customs department
- Now trying to remember to incorporate ‘guestimate’ first into other things
  - eg statistics calculations
- Encourages thought about resulting answer
  - Eg averages should make sense






100%
0%

Activity model

Mix 'n Match

- These very well received
- Learners often took photos at the end

- Inspired me to create more
- Will look at these types of activities later

- Next slide - a different type of matching activity
- Created for local needs




2
.33
.3
.25

ACTIVITY MODELS – WHAT AND WHY?

- Australian activities don't necessarily translate automatically
- Needs and contexts can be very different in 'developing' countries or communities
- Adult learners motivated to learn when they see the need
- Generating your own activities – 'connects' to your students and their local context as well as their particular learning needs

- Using 'models' – simple activity structures - as a basis makes it easier than trying to invent new ideas

LANGUAGE AND NUMERACY LEARNING

Language can be:

- A communications barrier
  - Issues of interpreters
  - Issues of accent and usage
- A learning goal
  - Students may want to learn English as much or more than the numeracy
  - Students see numeracy class as a way to practice English (often answer in English before interpreter finished)
  - This motivation can be harnessed for concept/language development

LANGUAGE AND NUMERACY LEARNING

- Usually adult learners are somewhere on the continuum from no English to keen English learner
- Wherever they sit it can be tiring always concentrating on language
- Language becomes an extra cognitive layer between them and numeracy learning
- Interpretation can slow momentum – bad for getting lesson started
- Sometimes good to have a break from language dependent activity



Language and Activity models

Many of the activity models I found useful fell into two categories with respect to language:

- Language free
  - Number patterns
  - Grids
  - Mix ‘n Match – symbols and pictures
  - Quick Questions
  - Sorting and ordering
- Language developing
  - On the Phone
  - Mix ‘n Match – words and symbols
  - Cooperative logic
  - True and false



LANGUAGE DEVELOPING ACTIVITIES: 'ON THE PHONE' MODEL

- Activity- Numbers on the phone
- Developed for T-L Ministry of Finance staff
- Based on 'back-to-back' model
- 'Phone' provides rationale for oral communication – need to listen and take note - gave it a contextual reality

Language Developing Activities: 'On the phone' model

- Used this activity model for reading numbers
- Not only in English – also Indonesian
- Why? – Decision by UN and Capacity Building countries to change traditional way of writing numbers
  - Changing role of commas & decimal points to British, Aus, US method rather than prior European, Indonesian method
- Very disempowering for finance workers
- Notation embedded in language and thinking

CHANGING NUMBER SYSTEMS
SOME PROBLEMS

- In Portuguese and Indonesian
  - '.' is a marker for thousands and millions
  - So $2.000 denotes 2 thousand dollars
  - $3.900.000 is 3 million 9 hundred thousand

  - ',' is a signifier for the decimal part of the number
  - $23,4 denotes 23 dollars 40 cents
  - Thought of in words as 23 comma 4
  - Embedded in the language
  - 23,4 and 23.4 both said and thought of as '23 comma four'

    Also applies in many countries our adult students come from



Changing number systems
Some problems

- Changing means confusion and errors
  - 23,4 and 23.4 both likely to be read aloud as ‘23 comma four’
  - In Ministry of Finance example
  - Mistakes magnified enormously in spreadsheets
  - Columns headed ($ m) – millions of dollars
  - or ($,000) – thousand of dollars



Changing number systems

Some problems

Example

- Actual amount (our notation) $2,980
- Is 2.980 thousand dollars (our notation)
- Should go into spreadsheet as

($,000)
2.980

- Instead may go in as

($,000)
2,980

- Later interpreted as $ 2,980,000

Changing number systems

Some problems

Another example:

- Not differentiating between '.' and ','
- Leads to adding of $ 2,345 and $ 4.56 by lining up the two symbols

  2,345

  4.56

Language Developing Activities: 'On the phone' model

- Have also used it with the T-L army group who needed to learn English
  - Describing shapes – [use shapes from *Rethinking Assessment*]
  - Giving Directions
    - Directions to go from one place to another – on street directories and maps
    - Giving and understanding directions in English and also approximate distances for use of scale
    - They liked acting out the phone conversations with senior officers

LANGUAGE FREE ACTIVITY MODELS

GRIDS

Activity – addition grids

- For practising addition skills
- Quick recognition of number facts
- Help with subtraction

Examples

- Whole number pairs to ten, twenty, hundred
- Decimal pairs to one, to ten ....
- Available on web – (search: *'Counting on'*)

Language free activities
Mix 'n match model

- Small group task
- Non- threatening – all the answers are there
- Break from worksheets and calculations
- Explores existing knowledge or can be revision

LANGUAGE FREE ACTIVITIES
MIX 'N MATCH MODEL

- Activity – percentage and fractions mix n match
- This example explores understanding of 'percentage' and fractions in symbols and pictures
- Can adapt to specific, current vocationally related percentages
  - eg – GST; tax rates; wastage; health statistics; reduction % for graphics
- Used this in workplace training situation
- Learners absorbed - enthusiastic

Language free activities
Mix 'n match model Variations

- Leaving a blank
- Put in one cards with only a blank as pair
- Learners create their own pair
- Requires closer look – more thought

- Providing open ended blanks
- Put in several blank pieces
- Get learners to create their own pairs

- Squaresaw – variation (handout)
- Challenging extension - students took photos at end

LANGUAGE FREE ACTIVITIES
MIX 'N MATCH MODEL VARIATIONS

Matching 'hands on' and other representations

- Activity arising from need to understand the meaning of decimal places
- Differentiate between 5 .5 .05 0.5 0.50 etc for purposes of tax calculation

- Set of decimal numbers in envelope
- Match to the amount of money – make with coins
- Match to number made with MAB blocks
- Match to position on the number line

Language developing activities
Mix 'n Match Model - variations

- Language of dimensions and measurement :
  - Collection of objects – cuboids (box shapes) and circular or cylindrical (plates, paper cups)
  - Slips of paper
    - Width - Height - Length
    - Circumference - Diameter – Radius -
    - Some repeated several times eg height
  - Match the labels to their meaning by sticking them in correct places.



Language developing activities
Mix 'n Match Model - variations

- Why?
  - Emerged after metric matching activity – eg width of finger – 1 cm
  - Students asked 'what is width?'
  - This group later to calculate area and volume – need the language
- Possible improvements?
  - Use approximate measurements as well
  - Throw in some challenging shapes
  - Use 2 D diagrams as well as the 3 D objects

Language free activity models

Quick Questions

- Began for assessment of in-head skills and later checking fact recall – eg tables
- Became a good way to begin lesson – focus students' attention
  - Can't expect consistent attitude to punctuality
- Became powerful means to revise or check recent learning before starting lesson
- Often showed skills needed revisit before proceeding

Language free activity models

Number patterns

- Began as informal assessment
- Based on *Mathematics: A new beginning – Getting Started* also *Strength in Numbers*
- Skills presented in problem solving situation – not test
- Allows observation of students' existing familiarity with number skills

Language free activity models

Number patterns

Also

- Involve finding ‘the rule’?
  - Useful later to introduce formulae
- Can go backwards and forwards
  - Reinforce /introduce ‘inverse’
  - Inverses good for checking subtraction & division calculations
  - Useful to introduce negative numbers in casual way



‘CONNECTING’ WITH COMMUNITY

Beginning a new relationship in a new community – eg Ministry of Finance in T-L.

Challenges:

- Establish rapport and trust
- Show respect for existing knowledge and strengths of learners
- Start with learners’ perceived needs

- Mistake starting with advisors’ perceptions of need –eg estimation
- Learners resistant to learning if they don’t see the need themselves

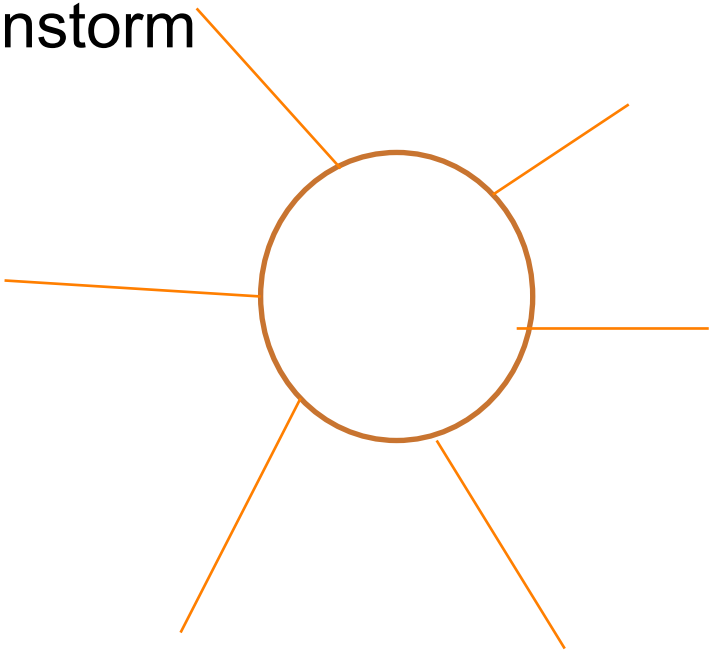
‘Connecting’ with community

One method:

- ‘Brainstorm’ Activity
- What maths do you need in this ... (insert your workplace or community) ...?
- Arrange learners in pairs
- Distribute large piece of paper to each pair

WHAT MATHS DO YOU NEED ....?

- Put the workplace or ‘community’ in centre of the circle and brainstorm



In pairs – approx 10 minutes

From workplace numeracy research

- Invisibility of maths in the workplace
- Numeracy related tasks in the workplace
  - are embedded within workplace routines
  - no longer resemble 'mathematics' from school
  - not appreciated or 'recognised' as mathematics or numeracy
- What people **can do** they no longer regard as mathematics
- True of life situations as well as workplaces
- Sometimes need to **tease out** and ask detailed questions

TEASING OUT THE NUMERACY

Examples:

- Do you need to do calculations with money?
- Do you need to do calculations with time?
- Do you need any measurement?
- Do you need to use graphs, charts or tables?
- Do you need to use maps, street directories, plans, diagrams?
- Do you need any formulae or rules for calculating things?

TEASING OUT THE UNDERPINNING NUMERACY SKILLS

Examples:

- What is involved in the money calculations?
  - Numbers? – what kind? – how big?
  - Decimals?
  - Fractions?
  - +, -, x, ÷ ?
- Do you do exact calculations or estimates?



CONNECTING NUMERACY & COMMUNITY

- Final step - involve learners in the topic planning decisions
  - eg Prioritise – write down three things from our list you would most like to learn about

- Encourage self awareness of existing skills
  - eg Rate current knowledge of the numeracy skills teased out – could use column headings like:
  - Can do
  - Need a bit of help/practice
  - Can't do yet

Connecting numeracy & Community

- Make sure the next few sessions start with the things learners wanted to learn about
  - eg fractions & percentages
- Introduce the perceived needs of advisors and others gradually
  - eg estimation skills and short cut calculations

Connecting numeracy & Community

- Introduce hands on materials for concept/skills development only when the need for that learning has become apparent to the learners
  - Eg fraction circles because they asked for fractions
  - Eg subtraction with straws because subtraction problems emerged in context of calculating taxes.
- Then introduce ‘hands on’ materials in context of researched learning styles (visual and kinaesthetic) &
- Understanding versus rote learning