

Embedding and Numeracy: a resource for ACE tutors



Embedding and Numeracy introduces strategies that will help ACE tutors who are not numeracy specialists to build everyday aspects of numeracy into ACE courses.

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What does numeracy include?

Numeracy is the use of numbers, calculations, measurement, shape, data and statistics in our daily lives. Numeracy is more than mathematics — it is the bridge between maths and everyday life. Numeracy involves understanding and using maths-related language; for example, understanding what is meant by ratios, percentages and fractions; carrying out calculations such as adding, subtracting, multiplying, dividing, estimating; understanding how to apply that language and those calculations to real-world tasks.

What do learners need to know or be able to do about numeracy in an ACE course?

In any ACE course that contains numeracy learners need to know and understand maths language related to that course and the basic maths concepts behind it; for example, a course for sports' coaches may require learners to understand specific information about distances, weights and time.

How can tutors help learners to use more numeracy?

Some learners are often not very confident about their maths or are nervous about tackling new kinds of maths. Tutors can help learners identify the numeracy they already use successfully in their daily lives. Tutors can also help learners manage the anxiety some of them have about maths.

This resource also suggests strategies for helping learners put numbers in order and to use relevant units of measure (for example grams and kilograms).

Tutors need to identify any numeracy that is required for their ACE course so they can work out what strategies are going to be most useful.

Strategy 1: Recognising the numeracy in the course

Numeracy is everywhere around us but we often don't recognise it. Tutors can help learners identify the numeracy they already use but are unaware of using. When learners recognise the skills they already use, they are more likely to have the confidence to develop new skills.



Here are suggestions for recognising numeracy:

1. At the start of a new subject, get your learners to discuss what they know about the numeracy that is going to be needed in that subject. This works as a whole group brainstorm or as an exercise for small groups or pairs.

In the examples below some of the points may seem to be more 'common sense' than numeracy to people experienced in these subjects — while others may struggle to understand them or to carry them out.

DIY house maintenance	Driver Licence training	Parenting courses
<ul style="list-style-type: none"> • Estimate lengths • Accurately measure in metres and millimetres • Calculate costs • Recognise shapes (on flat surfaces and in 3D) • Multiply numbers to calculate an increased area 	<ul style="list-style-type: none"> • Estimate speed and read the speedometer • Calculate distances • Understand tyre pressure • Calculate money to pay for petrol • Understand the numbers in road signs • Estimate the space needed to park the car! 	<ul style="list-style-type: none"> • Read a thermometer • Estimate size when choosing clothes • Read and understand graphs in the Plunket book • Understand volumes so we can measure medicine for children of different ages

2. Talk continually about how skills can be transferred from one situation to another. The skill of estimating is the same skill needed for estimating material lengths in sewing or in gardening or in driving. The scale of measurement may be different from one context to another but the skill and understanding needed are the same.

Recognising numeracy in a sports coaching course

Mere teaches a short course on coaching and refereeing netball. She wants to use the course as an opportunity for building numeracy skills. She knows there is far more numeracy involved in sport than most of her learners think! She plays the group a short clip of a Silver Ferns game. Mere then asks the group to think about the numbers they saw and heard in the clip. Their list includes:

- counting — the number of players
- estimating distance — the distances the shooter had to throw from different parts of the circle
- measuring length — the heights of players mentioned, the distance of throws
- timing the game — knowing how long until half time, understanding the 3 second holding rule.
- reading the score

Mere asks the learners to sort the list they have made into two groups which she labels 'Numbers' and 'Measurement'. She then asks them to choose which of those two groups they think their skills are strongest in, 'Numbers' or 'Measurement'.

Strategy 2: Making the most of opportunities for developing numeracy

Embedding numeracy begins with recognising the opportunities for teaching numeracy already existing within a course. The next step is to look for ways of expanding those opportunities with learning activities that are focused on learners' own goals.

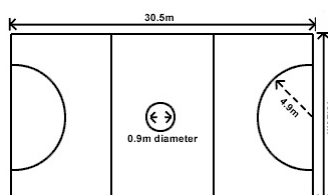


Here are some suggestions for making the most of opportunities to develop numeracy:

1. Think about what you plan to teach and identify possible numeracy demands — including numbers and measurements (time, length or weight, charts or graphs giving information).
2. Build on an identified numeracy demand by using it as a teaching opportunity; for example, talking about numbers bigger than, or smaller than, the number being used; halving or doubling the number and so on.
3. Use learners' own goals to direct the teaching opportunity; for example, if you know your learners struggle with decimal points then dividing and multiplying any number by 10 and showing what that means for moving the decimal point can keep the focus on decimal points.

Making the most of opportunities in sports' coaching

Mere's group are looking at the layout and measurements of a netball court using a paper map of a court with the measurements on it. She asks the group to measure out a netball court in the yard outside using a metre stick, a stick and a piece of chalk. To expand on this task she asks the group what area would be needed for 3 or 6 courts, and supports them as they work out their calculations. At this point she makes sure everyone can access the calculations that are in most of their mobile phones.



Strategy 3: Acknowledging maths anxiety

Maths anxiety — anxiety or fear related to using calculations and numbers — is very common. Google it and see! People are scared that they won't be able to do a maths task; fearful before they start that it will be too hard; scared they won't get the maths right. Maths anxiety often begins because of a poor earlier experience or lack of success in working with numbers. Acknowledging that maths can make people anxious can be helpful for some learners.



Here are some suggestions acknowledging maths anxiety:

1. Ask learners how they are feeling about the subject-related maths instead of going straight into working with numbers.
2. Talk about the maths-related skills and knowledge learners bring to the subject from other areas.
3. Be clear about what numeracy there will be in the course and the support available to work with it.
4. Help learners to recognise that a negative emotional response to numeracy is a learned response, that is, nobody is born disliking maths! Start by Identifying where these feelings stem from: for example, poor teaching, failed tests, missing school and so on.

Acknowledging maths anxiety in a sports coaching course

People on a netball coaching course have to learn to score the game and keep track of who starts each play. Mere knows many people find it quite confusing and their lack of confidence stops them volunteering to referee at games. She asks everyone to shut their eyes and to put up their hand to illustrate how nervous they feel about the scoring. If they feel really nervous they can put up two hands; if they are really confident just a finger! She tells them to open their eyes and look. Almost everyone in the room has at least one hand up, so they all laugh.

She asks them to turn to a neighbour and describe one aspect of maths in their daily lives that they do well. She gives some suggestions: paying bills on time; keeping track of the bank balance; shopping for bargains; saving money; measuring up alterations; or being on time. Mere also tells a story of when she first tried to do scoring and she realised that it was quite complicated, and she didn't do it well (people on the sideline were not impressed!). She talks about her own anxiety and the tips she got from more experienced coaches that made her feel better about her mistakes. Sharing her story (and laughing about it) made the group more relaxed and Mere felt the participants were going to be more able to tackle the skills they had to learn.

Strategy 4: Putting numbers in order

Learners need to be able to work with the numbers they come across as part of their subject. This includes being able to read and write relevant numbers and put numbers in order.



Here is a suggestion for developing confidence in ordering numbers:

Use numbers that occur in the course repeatedly for a wide range of teaching activities such as:

- putting the numbers in order
- identifying the next number or previous number
- discussing positive and negative numbers
- halving and doubling
- moving the decimal point to increase and decrease by a factor of 10
- reading or writing the number in word form (important for writing cheques!)

Putting numbers in order

Mere makes a list of the numbers found in a netball court and game :

30.5m court length; 15.25m court width; 50mm max court markings; 90cm centre circle diameter; 3.05m goal post height; 690-710 mm ball circumference; 400-450 gram ball weight; 3 second ball holding maximum; 15 minutes per quarter; 1 hour game; 5 minute half time interval; 2 minute maximum time per injury.

Mere wrote each number on a different piece of paper leaving off the unit of measure (so her list said 30.5, 15.25, 50, 90 etc). She asked each learner individually to put the numbers in order from large to small to give her an idea of their number sense.

The learners struggled with the numbers that had decimal points — so she knew she had to build in some extra help for that.

Strategy 5: Units of measure

In most daily numeracy tasks, numbers are given a unit of measure; for example, 3 apples, 1 bag of compost, 75 kg, 4 tonnes. Units of measure are specific to particular contexts and learners need to be able to recognise units of measure and do simple conversions between common units.

Here are some suggestions:



1. Help learners recognise units of measure and use them appropriately — this includes putting the correct unit of measure to numbers and calculations and writing the abbreviation or symbol for the unit of measure (grams to kilograms, gm/kg; minutes to hours, mins/hrs).
2. Have learners convert measurements from one unit to another for the particular ACE contexts. It is important to work with known and relevant units of measure so that learners get plenty of practice and success. This learning can then be transferred into less familiar situation.

Units of measure in sports coaching

Mere uses the list from the *Putting numbers in order* strategy to talk to her group about units of measure. She writes mm, cm, m on the whiteboard and asks learners to tell her what they stand for. They have a discussion about the relationship between them (they measure length or distance) and go from small to large (mm=1, cm=100, m=1,000).

To build up learners confidence in recognising the distances she gets them to estimate the hand span in millimetres, the length of the room in centimetres and the distance in metres from the room they are working in to the road. She then creates a table.

Number	Unit of measure	Object
30.5	m (metre)	court length

She gets the group to go through their netball rules book to find measurements and to enter them onto the table, using the abbreviation and the full term for the unit of measure.