The Minimum Core

In Initial Teacher Training

The aim of this resource is to provide teacher educators with practical strategies for embedding the Minimum Core (Literacy, Language, Numeracy and ICT) within CTLLS and DTLLS delivery and supporting the development of trainees' personal skills to Level 2 and beyond. It is particularly designed for tutor-assessors delivering EMCETT's blended-learning models of the new teaching qualifications. Hopefully, it will be of interest to teacher educators in general.

THIS DOCUMENT CONTAINS EMBEDDED HYPERLINKS AND IS THEREFORE BEST VIEWED AS AN E-COPY

CENTRES FOR EXCELLENCE IN TEACHER TRAINING

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Foreword

The Minimum Core in Initial Teacher Training is one of a short series of pamphlets produced by EMCETT to support new teacher educators and particularly those working with trainee teachers drawn from vocational backgrounds who are generally not graduates.

The diversity of teachers working in the Lifelong Learning Sector reflects that of the sector in which they teach. Unlike the schools sector, teachers working within adult education colleges, community-based settings, custodial environments, commercial and voluntary sector training organisations and (not infrequently) in further education colleges often lack prior educational experience of the type that will prepare them for studying and achieving a Level 5 teaching qualification.

> 'Skills for Life support: there will be no entry requirement in terms of literacy, language and numeracy skills, but all teachers will need to demonstrate specified standards by the end of their course.' (p8)
>
> Equipping our teachers for the future (DfES, 2004)

Personal literacy, language, numeracy and ICT needs are also not uncommon, making the minimum Level 2 requirement for personal skills, set by the Minimum Core, a challenge in itself. Many providers of the new ITT programmes, and understandably HEIs, set eligibility requirements (proof of, at least, Level 2 attainment on entry). This raises an important question regarding the accessibility of programmes for the significant numbers of teachers working in the wider sector, and particularly non-FE, and is also contrary to the spirit and letter of 'Equipping our teachers for the future' (DfES, 2004).

Other commonly encountered needs are those often referred to as 'Higher Education Study Skills' and include formal (academic) writing skills, critical thinking, Harvard Referencing, etc.

EMCETT's publications in this series are intended to help teacher educators to facilitate trainee progression through a Level 4/5 ITE programme. To this end, they include the following -

- The Minimum Core in Initial Teacher Training
- Thinking and Reflecting in Initial Teacher Training
- Learning Theory in Initial Teacher Training
- Academic Writing Skills in Initial Teacher Training

EMCETT believes that all trainees, even those with little prior experience of academic programmes of learning and assessment, are able to generate Level 4/5 output, given the right 'scaffolding' and support.

EMCETT-endorsed ITE programmes enable trainees to develop academic skills (critical thinking, reflective practice, academic writing and referencing) alongside the development of their teaching skills and knowledge. These two aspects of development are, however, treated separately in both delivery and assessment during the early modules and only come together in the latter part of the CTLLS programme or the Level 5 DTLLS content.

Contents

1. The Minimum Core - EMCETT's Approach

The requirement for all trainee teachers to meet the minimum core of literacy, language, numeracy in all post-16 teacher initial teacher education (ITE) programmes was first defined by FENTO in 2004. In September 2007, a revised minimum core specification was introduced alongside the new ITE qualifications and, for the first time, included an additional specification for ICT.

The minimum core reflects and addresses two essential requirements of teachers working within the wider FE System. Firstly, teachers of all vocational subjects need to understand fully how low ability in English, Mathematics and ICT might impact on access, vocational achievement and progression. Secondly, teachers must have sufficient personal skills in English, Mathematics and ICT to assess and support learners' needs. It is important that trainee teachers understand that this is not the same as being a specialist teacher of literacy, language, numeracy (LLN) or ICT, but is an intrinsic aspect of all good teaching.

The Minimum Core (2007) is a very detailed document with a great deal of technical language and it is EMCETT's view that most ITE providers do not find it helpful in determining how best to integrate it with the ITE curriculum. A companion guide to the Minimum Core was published shortly after and offers more practical advice to trainers and teacher educators alike and an interactive on-line resource has been more recently developed by LLUK (see hyperlinks, below).

Inclusive learning approaches for literacy, language, numeracy and ICT
Evidencing Personal Skills in Literacy and Numeracy

2. The Personal Skills Requirement

ITE providers need to ensure that trainees have met the minimum core requirement, with regard to personal skills, by the completion of a CTLLS programme or by the end of part (year) one of a DTLLS. There is no requirement, with regard to the minimum core, in respect of the PTLLS, stand-alone award. Trainees may, however, be exempt from this requirement if they possess prior literacy and numeracy qualifications at level 2 or above. Specifically, such qualifications must be:

1. at a minimum of level 2 (NQF/QCF) in England, or its equivalent in Scotland, Wales and Northern Ireland;
2. a pass or above, at a level equivalent to at least level 2 (NQF/QCF) in England, for example an A*-C in GCSE.

It is recognised that a Level 2 qualification, or indeed the *minimum* core specification, is a minimum level of personal skill necessary for teaching. Different curriculum areas may require varying levels of personal skill depending on the nature of the subject.

The following sections are intended to offer some practical strategies for integrating the Minimum Core within PTLLS, CTLLS and DTLLS programmes. The emphasis of the following diagnostics and support materials is on commonly presenting issues that arise within the context of ITE, rather than on an exhaustive coverage of all possible challenges faced by the adult population, as a whole.

3. Initial Assessment

Where a trainee does not possess an approved prior Level 2 qualification, initial assessment of personal skills is essential. This is best initiated at induction but could usefully be ongoing throughout the initial PTLLS stage of a certificate or diploma programme.

The key consideration for ITE providers will be the degree of support that a trainee may be likely to need in order to fulfil the minimum core requirement. Often, a trainee may be 'rusty' having had little opportunity or requirement to produce formally assessed work for some years or, maybe, since school. In such a case, good feedback and some on-line resources may address the deficit. Where, it is suspected, the challenge faced by the trainee is greater, it is worth considering whether they should be advised to take 'time-out' between a PTLLS and progression onto a CTLLS or DTLLS to access appropriate provision.

The following three pages provide an example of an initial assessment proforma that could be used at, or prior to, induction. The emphasis here is on the term *initial*; a more detailed assessment would ideally take place to validate the information gained by this somewhat 'cheap and cheerful' method.

The first page of the assessment provides 'pointers' to:

- where prior experience and tariff-endorsed qualifications may be available (including prior academic experience);
- prior and current teaching context and hours;
- level of current IT ability.

Page two supports a preliminary assessment of writing ability (it is the only example of wordage in EMCETT-endorsed, ITE programmes). Finally, page three is very rudimentary self-assessment of numeracy ability. (Note: a far more precise numeracy diagnostic can be found in Section 6, below.)

Initial assessment 1

Highest Prior Qualifications

Tariff Endorsed Qualifications	PTLLS	PEL	ELA	TPPL	CPPD	CDIP	WPP
	F / P / N	F / P / N	F / P / N	F / P / N	F / P / N	F / P / N	F / P / N
	F / P / N	F / P / N	F / P / N	F / P / N	F / P / N	F / P / N	F / P / N

F = Full Coverage   P = Part Coverage   N = No Coverage

Tariff Endorsed Literacy/Numeracy Prior Achievement (L2 and above)

Current Teaching Experience			
Subject Specialism/s	**Teaching Hours**	**Employer**	**Sector Context**
			FE / ACL / WBL / OL
			FE / ACL / WBL / OL
			FE / ACL / WBL / OL

Brief Summary of Prior Teaching Experience (specialisms, timescales, types of learner, etc)

Completed by: **Dated:**

Checked by: **Dated:**

Do you have regular access to a broadband-enabled PC: Y / N
Are you familiar with using: **Microsoft Word**   Very / OK / Not Familiar
                    Powerpoint   Very / OK / Not Familiar
                     Excel (spreadsheet)   Very / OK / Not Familiar
                     Internet?   Very / OK / Not Familiar
                    REfLECT?   Very / OK / Not Familiar
                    Facebook (or similar)?   Very / OK / Not Familiar
                    Blogs?   Very / OK / Not Familiar
                    Moodle (or similar)?   Very / OK / Not Familiar
                    YouTube (or similar)?   Very / OK / Not Familiar

Initial Assessment 2

What is learning? (150-250 words)

Is there a difference between your learning when you were child, compared with now you are an adult? (100-200 words)

In what ways are vocational and academic learning different? (50-150 words)

Is learning, something we need to do, or something that happens anyway? (50-100 words)

What has the greatest influence on learning, for example (50 -100 words)*: −*

- ▪ *the learner?*
- ▪ *the teacher/source of learning?*
- ▪ *the thing being learnt?*
- ▪ *the way learning takes place?*
- ▪ *etc*

So, what is the role of the teacher? (100-200 words)

Initial Assessment 3 (complete only if you <u>do not</u> have a 'tariff-endorsed' Numeracy award at Level 2 or above)

Place a small circle on the arrows to indicate you level of confidence.

Topic		*$%&!	Need Some Help	OK	Comments
Measurement	• Imperial	←————————————→			
	• Metric	←————————————→			
Decimal Calculations	• addition/subtraction	←————————————→			
	• multiplication/division	←————————————→			
Calculations with -	• negative numbers	←————————————→			
	• fractions	←————————————→			
	• Percentages	←————————————→			
	• proportions	←————————————→			
Calculations with -	• dimensions	←————————————→			
	• areas	←————————————→			
	• volumes	←————————————→			
Using formulae and equations		←————————————→			
Statistics	• mean/median/mode	←————————————→			
	• range	←————————————→			

(Note: trainees can be asked to complete and submit this Initial Assessment as an e-document. This enables a further 'layer' of IT assessment to take place through the completion process.)

4. Embedding LLN and ITC in Initial Teacher Education

Like any other area of curriculum, ITE yields naturally occurring opportunities to develop and evaluate personal skills in LLN and ITC.

Literacy	Written work presented for assessment
Language	During facilitated sessions (group-work, presentations, etc); classroom observation.
Numeracy	Examples of embedded numeracy within session plans together with classroom observations; action research project.
ITC	Use of ICT in the production of assessed work; on-line and blended-learning provision; classroom observation of embedded ITC within the vocational delivery.

5. Literacy Diagnostics and Support

Aspect of Literacy	Notes
Spelling	Create a personal dictionary/glossary (blank notebook or Word Doc)
Sentence Structure	Need a balance of complex and simple sentences, but within the constraints of 'Plain English'
Idiomatic Style	Appropriate for audience – formal and informal styles
Punctuation	Correct use of capitals; full-stops; commas; apostrophes; colons and semi-colons
Paragraphs	Ideas properly organised into paragraphs of related material. Logical sequence or paragraphs.

Spelling

In the main, the words that an individual misspells are relatively few in number compared to the total number of words which are correctly spelt. Further, misspellings are not usually random but tend to be, habitually the same – or same type of* - words. This means that tackling poor spelling is a finite and achievable task. The most obvious strategies for improving spelling are:

- the use of spell-check as an identification process ..... coupled with -
- a proactive approach to recording misspellings, identified by a spell checker, in a personal dictionary (an alphabetically ordered blank note-book, Word document or Word/Excel table).

   * (for example: -ible Vs -able)

Mnemonics can also be useful (such as 'one collar and two socks are ne_cess_ary).

Perhaps the most effective support that trainees can receive with regard to spelling (and punctuation) is for work to be corrected by the tutor. Teacher educators may feel unsure about this – given the level of the teaching qualification and the nature of the learners – but precisely targeted feedback on errors is a very effective strategy in improving trainees' writing.

Where trainees work is submitted electronically, 'tracked-changes' are an effective tool for providing clearly targeted feedback.

The following table lists some of the more commonly misspelt and confused spellings.

affect (verb): to influence. "*it affected me deeply*"	**effect** (noun): result. "*this will have a deep effect on services*"
adverse (adjective): unfavourable. "*it had an adverse effect on me*"	**averse** (adjective): opposed/against. "*I am averse to dangerous sports*"
principle (noun): standard/rule of conduct. "*it's against my principles to do that*"	**principal** (noun or adjective): most important. "*the principal rule*" "*he was the principal of the school*"
stationery (noun): writing materials. "*I'm running out of stationery*"	**stationary** (adjective):standing still. "*the car was stationary*"
current (adjective): happening now. "*the current situation is*" or **current** (noun): electricity.	**currant** (noun): dried grape. "*currant cake*"
inquire [inquiry] (verb): to investigate. "*the police launched an immediate inquiry*"	**enquire** [enquiry] (verb): to ask. "*he enquired after her health*"
complement (noun): a complete whole (verb): something that completes. "*we now have a full complement*" "*the scarf complements her dress*"	**compliment** (noun/verb): praise. "*he complimented me on the quality of the work*"
council (noun): assembly of people. "*the council meets on Thursdays*"	**counsel** (verb): advise. (noun) recommendation. "*I counselled him during this difficult time*"
dependent (adjective): relying on. "*he was dependent on the regular medication*"	**dependant** (noun): a person who depends on someone else. "*he has three elderly dependants*"
ensure (verb): make certain. "*he ensured the door was locked*"	**insure** (verb): protect against risk. "*I've just insured my car*"
disk (noun): computer storage device. "*always back-up important data on disks*"	**disc** (noun): flat, circular object. "*the sun was a bright orange disc*"
practice (noun): "*part-time working is a common practice, these days*"	**practise** (verb): "*she was practising the violin*"

Sentence Structure

Poor sentence structure is easy to observe but harder to diagnose with a view to giving precise feedback. It is often accompanied by inappropriate use of commas and full-stops and a tendency to write as if speaking. If sentence structure is to be easily improved, it may be, most directly, through the analysis of some good examples of writing (probably from non-academic sources). Examples of well constructed sentences can be used as models (scaffolds) for the trainee to generate their own versions, following a similar pattern. This type of analysis is also invaluable for understanding and improving punctuation and paragraph structure.

Idiomatic Style

Trainee teachers need to be able to write in a formal style (e.g. letters, reports) to support professional processes. They should also be comfortable writing in a more relaxed and conversational way when creating learning resources that are engaging for learners.

The Difference Between Formal and Informal Writing (ezine article)

Trainees who have not had the benefit of a prior education that supported the development of academic writing skills may benefit from working with masks or scaffolds that will help them plan and structure their writing to conform with accepted conventions of essay and report writing.

Scaffolding Hyperlinks
Tokyo University
Essay Scaffold
Scaffolding Students' Writing

Trainees sometimes have a tendency to 'overdo' formal writing, possibly in an attempt to make there work appear more academic. One way to moderate this tendency is to introduce basis principles of Plain English.

FORMAL	PLAIN ENGLISH	FORMAL	PLAIN ENGLISH
accomplish	do	acquire	get/gain
approximately	about	assist	help
ascertain	find out	commence	start
concerning	about	currently	now
considerable	large	despatch	send
desire	wish	dwelling	house
endeavour	try	I am in receipt of	I've got
implement	carry out	in excess of	more than
in consequence	so	in lieu of	instead of
in respect of	about	initiate	begin
in the event of	if	persons	people
majority of	most	practically	most
prior to	before	regret	sorry
purchase	buy	request	ask
remittance	payment	utilise	use
remuneration	payment/wages	terminate	end/stop
state	tell/say/mention	trust	hope
at this moment	now	come to a decision	decide
due to the fact that	because, as	I have not commenced	I haven't started
in the course of	during	owing to the situation that	because, since
in the event that	if	there is a reasonable expectation that	probably
prior to the occasion when	before	with regard to	about
taking into consideration such factors as	considering	should a situation arise where	if

Punctuation

The section that follows provides both an overview of commonly occurring punctuation problems and also a potential learning support resource which can be used with trainees.

Capitals are used in various related ways as well as at the beginning of sentences.

Proper names and places:	Bill; Anne; Jyoti; Buckingham Palace; the Midlands.
Labels based on proper names:	Marxist; Blairite; Victorian.

Titles used with a name:	President Obama; the Duke of York (but the duke).
Deities:	Allah; God; Brahma; Buddha.
Organisations: (note 'and' and 'of')	Learning and Skills Improvement Service; House of Commons.
Periods of history:	the Renaissance; the Black Death; the Middle Ages.
Acts of parliament, Policy Documents:	Disability Discrimination Act; Every Child Matters
Days and months:	Wednesday; February.

Commas are by far the most complex aspect of punctuation to master but can be thought of as a type of pause in the flow of writing.

◗ **Separating items in a list**
The drawer contained paper-clips, rubber-bands, pencils and paper.

◗ **Separating parts of sentence which have a different sense**
He stopped at the kerb, looked both ways, then crossed.

◗ **Inserting extra information into a sentence**
Compare -
The learner finished the assignment in record time.
The learner, whose favourite subject was IT*, finished the assignment in record time.*

◗ **Separating an introductory word or phrase from the main part of the sentence**
However, it can still be done by Friday.
After the first lesson, I decided to try a different approach.
When everyone had finished, I decided it was time for a break.

◗ **Making the sense clearer (usually less ambiguous)**
Compare –
I left out several commas which made the article harder to read.
I left out several commas, which made the article harder to read.
(What made the first sentence hard to read? Was it the commas that caused the problem or the leaving out of the commas? Note: the meaning is clear in the second sentence.)

Apostrophes are only used in two ways – but nevertheless cause confusion.

◗ **Indicating possession (belonging to)**
To refer to the eyes that belong to the dog, you would write: The dog's eyes.
Note: if there were more than one dog, you would write: The dogs' eyes.

◗ **Replacing missing letters, e.g. -**
isn't (is not), hasn't (has not), couldn't (could not), etc.
what's (what is), how's (how is), where's (where is), etc.
I'll (I will), we'll (we will), etc.

Colons are used in two ways.

◗ **Introducing an example or quotation**

Freda's advice in this situation was always good: 'It may never happen'.

◗ **Introducing a list**
The sale will include: telephones, dictation recorders, fax machines, desk top and lap top computers, modems and calculators.

Semi-colons are also used in two ways.

◗ **Creating more of a pause than a comma but not as much as a full stop**
The team tactics really paid off; the opposition were well and truly beaten.

◗ **Separating lists that already have commas in them**

….. government departments such as health; agriculture, food and fisheries; environment and the foreign office.

Paragraphs

Uncertainty about how to organise writing into paragraphs is often an issue for trainees who have not had (recent) experience in formal writing. There are good, freely available resources in how to use and structure paragraphs available on the internet. Follow the hyperlinks below for useful examples.

Basic paragraph structure
Graphical aids for structuring paragraphs

Mastering the use of paragraphs is the key to producing well structured pieces of writing. Trainees might also benefit from analysing a couple of pages of high quality writing. This is also invaluable in developing an understanding of correct and creative sentence structure and punctuation.

6. Numeracy diagnostics and Support

The following paper-based test* is one developed in the early days of supporting numeracy with YTS trainees. It is arguably the shortest and most insightful diagnostic test available for numeracy skills, and is equivalent to between L2 and L3 Key-Skills.

(The original source of this test cannot be located – please inform EMCETT if you are able to pin-point the original source.)

The test is designed to enable a tutor or numeracy specialist to evaluate a trainee's needs by observing the process of problem solving as much as by marking the answers to each problem. (A blank version of this test is available in the Appendix to this pamphlet)

Application of Number (Initial Assessment)

1

a **245 + 17.6 =**

Tests understanding of decimals and 'place value'. Also note 'carry-over'.

Can do ☐

b **£27.85 + £3.25 =**

Money is a more familiar use of decimals and may therefore be easier to understand and calculate. Also note lining-up of decimal point and 'carry-over'.

Can do with help ☐

c **18.36 – 4.6 =**

Similar to the above but subtraction. Note lining-up of decimal points and 'borrowing'.

d **350 ÷ 17.5 =**

= 20 (17.5 X 2 = 35; 35 X 10 = 350)

Can not do ☐

2

a Which of the following fractions has the greatest value?

$$\frac{5}{4} \quad \frac{3}{4} \quad \frac{4}{3} \quad \frac{4}{5}$$

Tests understanding of relative size (value) of fractions

Can do ☐

Can do with help ☐

b Calculate the value of the following.

$$\frac{4}{5} \quad \text{of} \quad 100 =$$

Calculating using fractions. (Note the link to percentages)

Can not do ☐

3

a What is <u>approximately</u>

$$\frac{21 \times 0.25}{5.5} =$$

21 is approximately 20. 0.25= a quarter (therefore a quarter of 20 = 5). 5.5 is approximately 5. Answer = 1

Can do ☐

Can do with help ☐

b Round off to the nearest 10 –

106.6 =

These are tricky – the single decimal place tends to encourage rounding up to the nearest unit/integer rather than 10.

Can not do ☐

21378.2 =

4

Work out the floor area in the plan below.
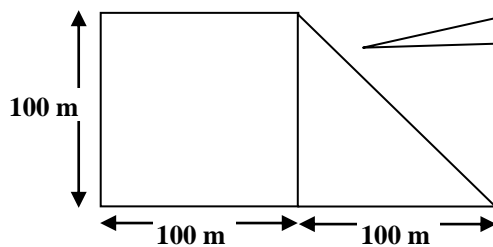
Tests understanding that the triangular shape is half the area of the square.

Can do ☐

Can do with help ☐

100 m

100 m   100 m

Can not do ☐

Floor area   =

5

You need to clean the work surfaces with a disinfectant solution. The instructions tell you to mix **50 millilitres** of disinfectant to **1 litre** of water. You need to mix up a total of **3.5 litres** of solution. How much disinfectant will you use?

Can do ☐

Can do with help ☐

Amount of disinfectant =

This requires conversion of a formula expressed in words to a mathematical equivalent

Can not do ☐

6

The total cost of a service to the customer can be calculated as follows.

Total price (**P**) = cost of staff time (**T**) + cost of stock used (**S**) + profit. What would be the profit or loss on this service if –

P = £76
T = £46
S = £7

This requires manipulation of the formula to isolate a particular value. Actual values have to be inserted into the right place.

Profit/Loss =

A service to the customer costs **£12.00 + VAT at 17.5%**.
What is the total cost?

A calculation using percentage. Some people will calculate this mentally ...
17.5% = 10% + 5% + 2.5%
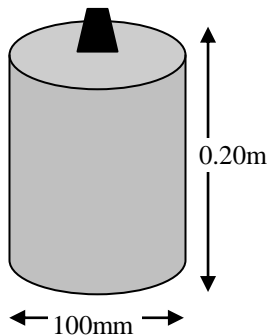
Total cost =

7

This is a cylindrical container with a diameter of **100mm**. Its height is **0.20 metres**.

0.20m

Calculate its volume using the formula - πr^2 **x h**. (**Take Pi to equal 3.**)

100mm

This type of problem often causes concern. The key is, 'can they apply the formula'?
Note: the different units - metres and millimetres

Volume =

8

It was **2 deg C** at teatime yesterday. By midnight the temperature had fallen by **7 deg C** and then risen by **3 deg C** at breakfast.

What was the temperature at breakfast =

Can do

Can do with help

Can not do

A survey of weekly average pocket-money was carried out with 20 children aged 12-13yrs, giving the following results.

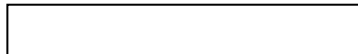| Pete	£8	Kev	£5	Aiden	£4	Julie	£5
Sue	£10	Naomi	£4	Bev	£10	Nissa	£0
Jim	£2	Jack	£10	Lou	£5	Joe	£3
Aisha	£25	Nick	£3	Gaz	£8	Raj	£15
Jill	£5	Chris	£20	Sharon	£15	Josh	£50

Can do

Can do with help

Can not do

Use the chart below to plot a histogram to show these results graphically. Label your scales and axes appropriately.

	<£4	£5-9	£10-14	£15-19	£20-24	£25-29	>£30

9

Using the figures in question 10, calculate the following.

Can do

The Mean =

The Mode =

The Median =

The Range =

Can do with help

Can not do

Supporting Numeracy

The following table summarises typical strategies for that are effective in supporting some commonly occurring challenges for adult learners. It is recognised that some of these are not issues that we would wish to see in trainees entering initial teacher education.

	Tips/Methods
Fractions	Fold paper to show equivalent fractions and to demonstrate how to simplify fractions
	link to decimals and percentages (as below)
Percentages	parts out of 100
	link to money (£1 = 100p; 50p = ½ of a whole £1)
	link to decimals and fractions (25% = ¼ = 0.25) – learn for each of the 'common' fractions
Proportions	1:4 = 1 part to 4 parts (NB total = 5 parts)
	link to percentages and fractions – 1:4 = 1/5 to 4/5s = 20% to 80%
Decimals	addition and subtraction – make sure decimal points line up
	link to decimal money (£10; £1; 10p; 1p) to explain 'place value', 'borrowing' and 'carrying over'
	multiplication and division by 10 – note 'moving' decimal point
	multiplication of two decimal numbers – (a) count the total number of decimal places in both numbers (b) treat as whole numbers (i.e. forget the decimal points) and multiply (c) finally move decimal point to the left as many times as the total number of decimal places at (a)
	dividing a decimal number by a whole number – make sure the decimal points line up, above and below the division line
	division of two decimal numbers – (a) move the decimal point of the divisor to the right until it becomes a whole number (b) move the decimal point of the number to be divided the same number of times (places) (c) divide as if by a whole number
Tables	knowledge of Times Tables is a fundamental underpinning skill for multiplication and division – start with 2s, 5s, 10s, 3s & 4s – then show how much of the rest has been covered by reversing the multiplication (e.g. 4x8 = 8x4)
Formulae	spell out in words and symbols
	work out everything in brackets first
	NB1: formulae inevitably involve calculation NB2: formulae will be covered in (a) work with areas and volumes (b) conversions (e.g. metric to imperial)
Statistics	**(arithmetic) mean** – commonly known as the average = sum of values/number of values
	median – the middle value when all the values are arranged in order from lowest to highest
	mode – the most frequently occurring value (most appropriate when measuring the number of occurrences within a category e.g. eye colour)
	range = difference between the highest and smallest values
	interquartile range – (a) arrange all the values in order from the lowest to the highest; (b) work out the values that lie at the ¼ and ¾ positions along the series (similar process to calculating the median, which is the value at the ½ way point) – these are the 1st and third quartiles; (c) the interquartile range is the difference between these two values – its purpose is to avoid extreme values giving a false impression of the spread of the data.
	NB1: measures of average (mean, median and mode) tell you where the bulk of the data lies - (if the average height of men is 5'7", then most men are somewhere around this height). NB2: measures of dispersion (range and interquartile range) tell you how far the data spreads around this average.

Additional note regarding measures of average

A basic understanding of <u>descriptive</u> statistics is important in teaching. The reason for this is not, however, readily understood by teachers and teacher educators alike. Teachers need to understand what data is telling them in order for them to make meaningful judgements about learner progression and to engage in quality improvement and (increasingly) project funded Action Research.

Measures of average typically cause anxiety because they appear to be esoteric mathematical concepts rather than – what they are – intuitively straightforward ways of describing data. The following exercise is useful in preparing trainees to carry out a quantitative analysis of data in support of a mini-research project.

Survey of Pocket Money	
	Per Week
Student 1	£8.00
Student 2	£7.50
Student 3	£10.00
Student 4	£12.50
Student 5	£12.00
Student 6	£120.00
Student 7	£5.00
Student 8	£0.00
Student 9	£10.00
Student 10	£15.00
Total	**£200.00**
Mean	**£20.00**

The example to the left may be unrealistic but is nevertheless a good demonstration of the need to understand different types of measure of average. It also illustrates the concept of range.

1. The *arithmetic mean* - our common understanding of *average* - is, in this example £20 (£200 divided by the total number of students – 10).

2. However, note Student 6 has an abnormally high amount of pocket money (£120). If this value is taken out the *average* falls to £8.99 (£80 divided by 9). This means that the mean for all 10 students is over twice as much as the average for 90% of the sample and is therefore very misleading.

> Therefore extreme values make the conventional measure of average (the mean) unreliable.

3. The range of the data (£0 to £120 = a range of 120 in a small sample of 10 bits of data) gives us a clue that the data may be skewed by an extreme value.

4. Rearranging the data in order from the smallest value to the highest makes that extreme value and 'skewedness' stand out. It also shows how the *median* (or *middle* value) is more representative of the 'true value' in this case.

5. The median in this even set of data lies between Students 3 and 9 when the data is arranged in size-order. In this case the median is clearly £10 – a much more sensible value of average for 90% of the data.

6. Grouping the data enables us to understand the pattern of the data more clearly by allowing us to visualise it as a histogram (easily produced using Chart Wizard in Excel). The chart below demonstrates this.

Survey of Pocket Money	
	Per Week
Student 8	£0.00
Student 7	£5.00
Student 2	£7.50
Student 1	£8.00
Student 3	£10.00
Student 9	£10.00
Student 5	£12.00
Student 4	£12.50
Student 10	£15.00
Student 6	£120.00

Survey of Pocket Money

| Series1 | 1 | 2 | 3 | 3 | 1 |

Viewing the data in this way enables us to see, straight away, that the majority of it falls between £8 and £16. This is known as the *mode* or *modal* average which is a measue of where the most frequently occuring data can be found.

The importance of average, is that we make inferences regarding groups of data (groups of learners?) based on this measure and we should therefore be aware that, at times, this can be misleading.

There is clearly much more depth to descriptive statistics than that presented above, but a key understanding of the different measures of average is an important foundation to understanding data and therefore evidence-based teaching and quality improvement.
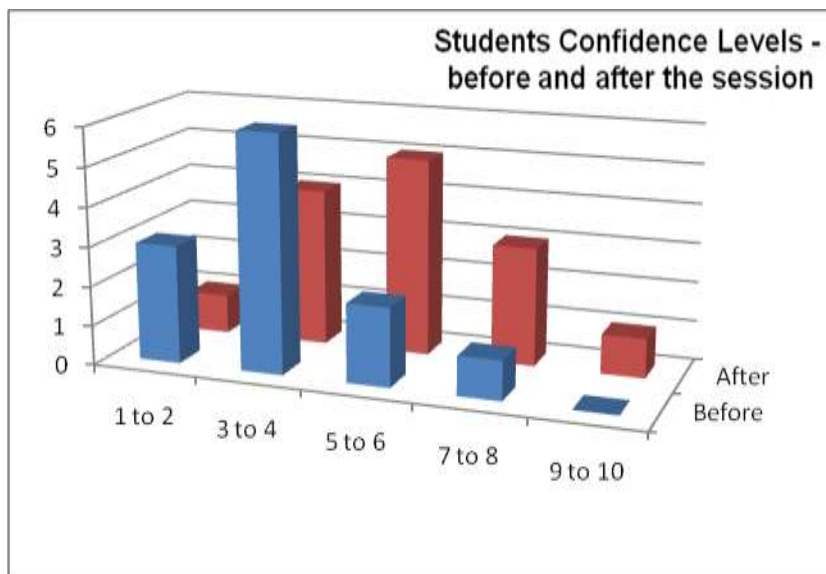

For example the chart to the left shows data on student confidence on a particular topic collected both before and at the end of a session.

It is clear that the data collected at the end of the session shows some shift towards increased levels of subject confidence, but how convincing is the improvement? Could it be a random variation or a modest change reflecting students' wish to please the teacher?

The chart on the right is far more convincing in suggesting that there has been a real improvement in levels of confidence, as a result of the session. Not only has the average clearly shifted from about 3.5 to 6.5, the variation (range) in the data has been reduced.

This sort of inference could be validated through the application of a statistical test of significance, but for trainee teachers, we would argue that and understanding of these principles is sufficient.
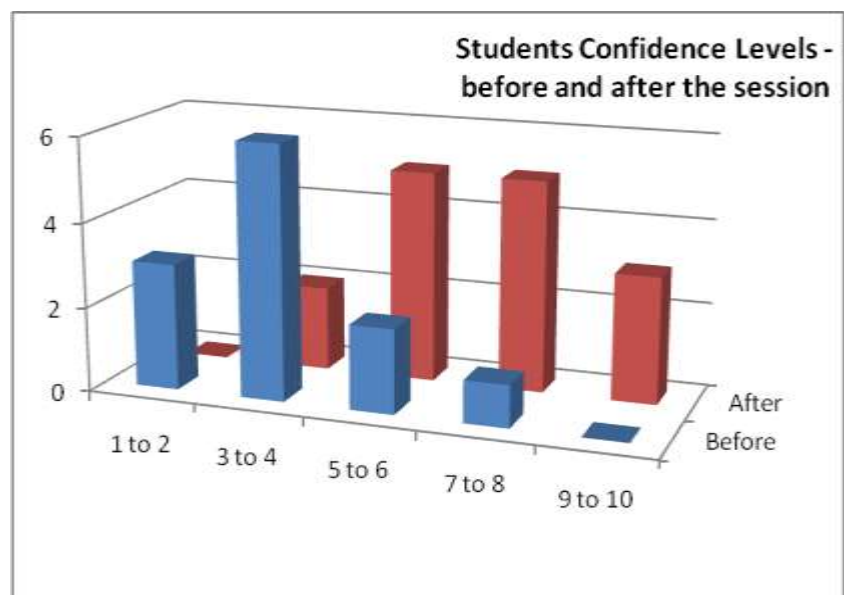
7. ICT Diagnostics and Support

Information and Communication Technologies is a broad term and is becoming broader as technology advances. In addition to the definition given by LLUK in 2007 we must now consider games technologies, social networking, online video, 3D video and cloud-based resources as all likely to influence teaching and learning.

Teacher education must address the significant challenge presented by new technologies; and quickly. It is not uncommon for teachers to lag considerably behing their learners' understanding and use of technology. Further, teacher educators frequently find themselves at least one step behind the teachers. This situation has to be turned around.

The 2007 reforms of teacher education for the Lifelong Learning Sector were preceeded by the publication of Equipping our Teachers for the Future which laid out the proposed changes to the qualifications and professional development of teachers in the sector. One of the expectations of the new ITE awards for teachers was that they should include delivery by 'blended learning: teacher training is now increasingly delivered using e-learning, so that trainees can learn, when and how they choose' (Section 3.6, p9). Blended-learning delivery has the distinct advantage that trainees use new technologies in the process of following a programme of ITE. It should also be noted that both the assessment criteria for the new awards and the new professional standards for teachers in the Lifelong Learning sector include frequent references to the application of ICT and new technologies within curriculum design and delivery.

> **Inclusive learning approaches for literacy, language, numeracy and ICT**
>
> ICT covers a much wider range of technologies than computers and computer-related hardware and software. ICT may also include:
>
> - digital cameras, camcorders and other image capturing equipment
> - interactive whiteboards
> - digital television, video, audio and other related multimedia equipment
> - mobile phones and associated technology to support learning
> - learning platforms
> - graphic calculators.
>
> **(Page 47) LLUK; Nov 2007**

Initial Assessment for ICT

Any degree of on-line learning is now likely to require a good broadband connection, which may still be problematic in certain geographical locations. Access to broadband is, therefore, worth checking with all trainees.

It is not uncommon for new users of computing technologies to 'jump into' working with a software application without having first mastered the basic underpinning skills of mouse or touch-pad manipulation. These are skills that are best taught in a one-to-one mentoring context and include -

- mouse/touch pad control;
- click and drag;
- drop-down menus;
- delete and backspace;
- use of cursor keys;
- edit functions: cut, paste, copy, format painter, etc.

- undo and redo

At the next level, the following skills are likely to be the most frequent need for teachers following a teacher education programme or in everyday professional practice.

- Microsoft Office applications – particularly Word, Powerpoint and (less often) Excel.
- E-mailing
- Internet searches using a search engine
- Interactive Whiteboards and associated functionality
- Moodle or similar virtual learning platform

(The use of Powerpoint has a controversial aspect. The correct use of Powerpoint is to illustrate and engage the listener not to reduce the teaching role to one of 'reading the text on the screen' which is both tedious and unnecessary. It is therefore important that teacher educators model best practice in the use of Powerpoint. Essential to this is the use of embedded graphics, animation, video and sound.)

8. Understanding the impact of low LLN and ICT skills

It is not uncommon for vocational teachers to resist the requirement that they should support, directly or indirectly, LLN and ICT skills development needs of their vocational learners. This reticence often masks a level of anxiety about the teacher's own personal skills or they may simply not see the relevance of it. There is, however, no valid reason for denying the relevance or value of embedding Skills for Life (Functional Skills) within the vocational context. Poor literacy, numeracy, language and ICT skills clearly present a major barrier for learners in achieving and progressing vocationally.

Section 4.1 (p9) of LLUK's companion guide to the Minimum Core highlights the importance and the requirement for vocational teachers to understand and respond to low skills in this area.

The professional knowledge and understanding outlined in the *New overarching professional standards for teacher, tutors and trainers in the lifelong learning sector*, emphasises the need for all teachers to have an understanding of:

- the personal, social, cultural and linguistic diversity of learners;

- the implications of learners' social, cultural and economic backgrounds;

- the concept of inclusive learning;

- the broad range of learning needs.

The minimum core further describes these characteristics in relation to literacy, language, numeracy and ICT. Underpinning this understanding will be an awareness of:

- language – varieties of spoken and written English; the link between language choice and personal, community and geographical identity; the role and function of Standard English; multilingualism;

- the linguistic, cultural and educational backgrounds of learners; the impact this may have on their learning, including literacy, language, numeracy and ICT skills development

- the role of literacy, language, numeracy and ICT and wider personal learning and thinking skills in enabling learners to become active citizens and participate in society and the modern economy

- the social, personal and economic consequences of diverse literacy, language, numeracy and ICT backgrounds; strengths, experience and motivation of learners; personal, social, cultural, institutional, teaching and learning barriers to literacy, language, numeracy and ICT acquisition

- the range of specific learning difficulties and disabilities that may affect literacy, language, numeracy and ICT acquisition and learning.

The above bulleted points from the companion guide are useful as a basis for group-work in exploring the relevance of the Skills for Life or Functional Skills within the wider curriculum.

7. Other On-Line, Learning Support Resources

LSIS – endorsed resources

Excellence Gateway – LLN Support Programme

Brain Games

Functional Skills: Being Functional

Cliffhanger Studios: ESOL

EMCETT's 9 CPD Builders (these are interactive CPD resources hosted on the Excellence Gateway)

Teaching Business - Developing and maintaining subject specific knowledge and skills

Teaching Engineering - Developing and maintaining subject specific knowledge and skills

Teaching in the Creative and Media sector - Developing and maintaining subject specific knowledge and skills

Teaching Construction - Developing and maintaining subject specific knowledge and skills

Teaching Mathematics - Developing and maintaining subject specific knowledge and skills

Teaching in the Society, health and development sector - Developing and maintaining subject specific knowledge and skills

Teaching Science - Developing and maintaining subject specific knowledge and skills

Teaching in the Land based sector - Developing and maintaining subject specific knowledge and skills

Teaching Information Technology - Developing and maintaining subject specific knowledge and skills

8. Conclusion

EMCETT seeks to continue to develop a resource base that may be freely available to the sector to support the implementation of the minimum core requirement in teacher education. We invite feedback from teacher educators and educationalists and welcome a critical dialogue about the ideas and approaches presented here in the sincere hope that we can improve the support available through co0llaborative effort and critical dialogue.

Feedback should be addressed to:

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Appendix

Application of Number (Initial Assessment)

1	
a **245 + 17.6 =**	Can do ☐
b **£27.85 + £3.25 =**	Can do with help ☐
c **18.36 − 4.6 =**	
d **350 ÷ 17.5 =**	Can not do ☐

2

a Which of the following fractions has the greatest value?

Can do ☐

$$\frac{5}{4} \quad \frac{3}{4} \quad \frac{4}{3} \quad \frac{4}{5}$$

Can do with help ☐

b Calculate the value of the following.

$$\frac{4}{5} \quad \text{of} \quad 100 =$$

Can not do ☐

3

a What is <u>approximately</u>

Can do ☐

$$\frac{21 \times 0.25}{5.5} =$$

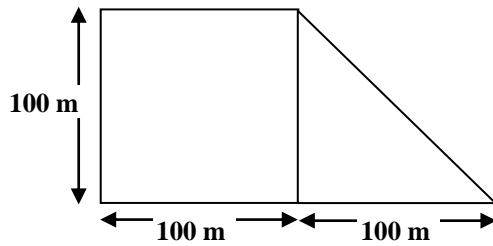Can do with help ☐

b Round off to the nearest 10 –

106.7 =

Can not do ☐

21378.2 =

Use this space for any additional working out.

4

Work out the floor area in the plan below.

100 m

100 m   100 m

Floor area =

5

You need to clean the work surfaces with a disinfectant solution. The instructions tell you to mix **50 millilitres** of disinfectant to **1 litre** of water. You need to mix up a total of **3.5 litres** of solution. How much disinfectant will you use?

Amount of disinfectant =

6

The total cost of a service to the customer can be calculated as follows.

Total price (**P**) = cost of staff time (**T**) + cost of stock used (**S**) + profit.   What would be the profit or loss on this service if –

P = £76
T = £46

S = £7

Profit/Loss =
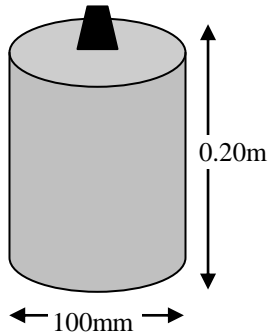
Use this space for any additional working out.

7

A service to the customer costs **£12.00 + VAT at 17.5%**.
What is the total cost?

Total cost =

Can do ☐

Can do with help ☐

Can not do ☐

8

0.20m

100mm

This is a cylindrical container with a diameter of **100mm**. Its height is **0.20 metres**.

Calculate its volume using the formula - πr^2 **x h**. (**Take Pi to equal 3.**)

Volume =

Can do ☐

Can do with help ☐

Can not do ☐

9

It was **2 deg C** at teatime yesterday. By midnight the temperature had fallen by **7 deg C** and then risen by **3 deg C** at breakfast.

What was the temperature at breakfast =

Can do ☐

Can do with help ☐

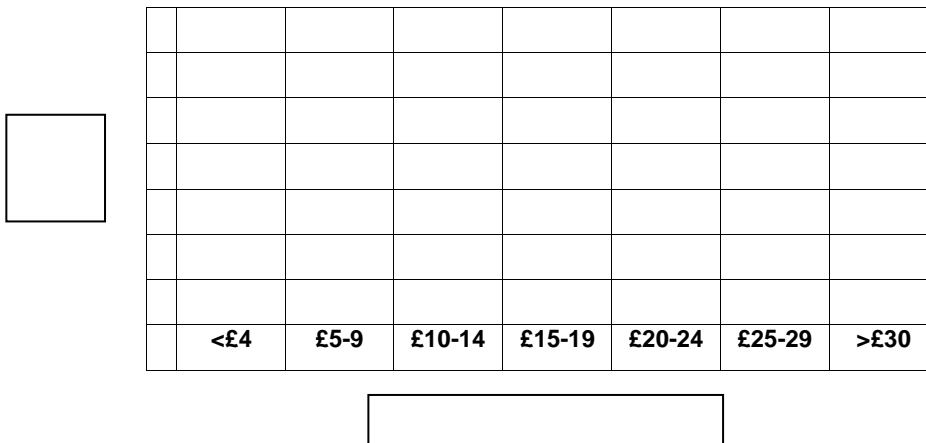Can not do ☐

Use this space for any additional working out.

10

A survey of weekly average pocket-money was carried out with 20 children aged 12-13yrs, giving the following results.

Pete	**£8**	Kev	**£5**	Aiden	**£4**	Julie	**£5**
Sue	**£10**	Naomi	**£4**	Bev	**£10**	Nissa	**£0**
Jim	**£2**	Jack	**£10**	Lou	**£5**	Joe	**£3**
Aisha	**£25**	Nick	**£3**	Gaz	**£8**	Raj	**£15**
Jill	**£5**	Chris	**£20**	Sharon	**£15**	Josh	**£50**

Use the chart below to plot a histogram to show these results graphically. Label your scales and axes appropriately.

	<£4	£5-9	£10-14	£15-19	£20-24	£25-29	>£30

11

Using the figures in question 10, calculate the following.

The mean =

The Mode =

The Median =

The Range =

Use this space for any additional working out.