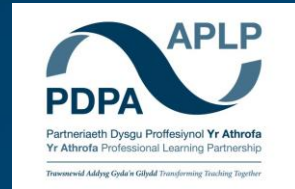




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ECAD6051 – Session 3

Mathematics and Numeracy

PGCE

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Aims



- Revisit and understand The Numeracy Framework
- Review the 5 Proficiencies
- Planning cross-curricular lessons or activities (Numeracy)
- Piloting Maths and Numeracy activities



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The Numeracy Framework

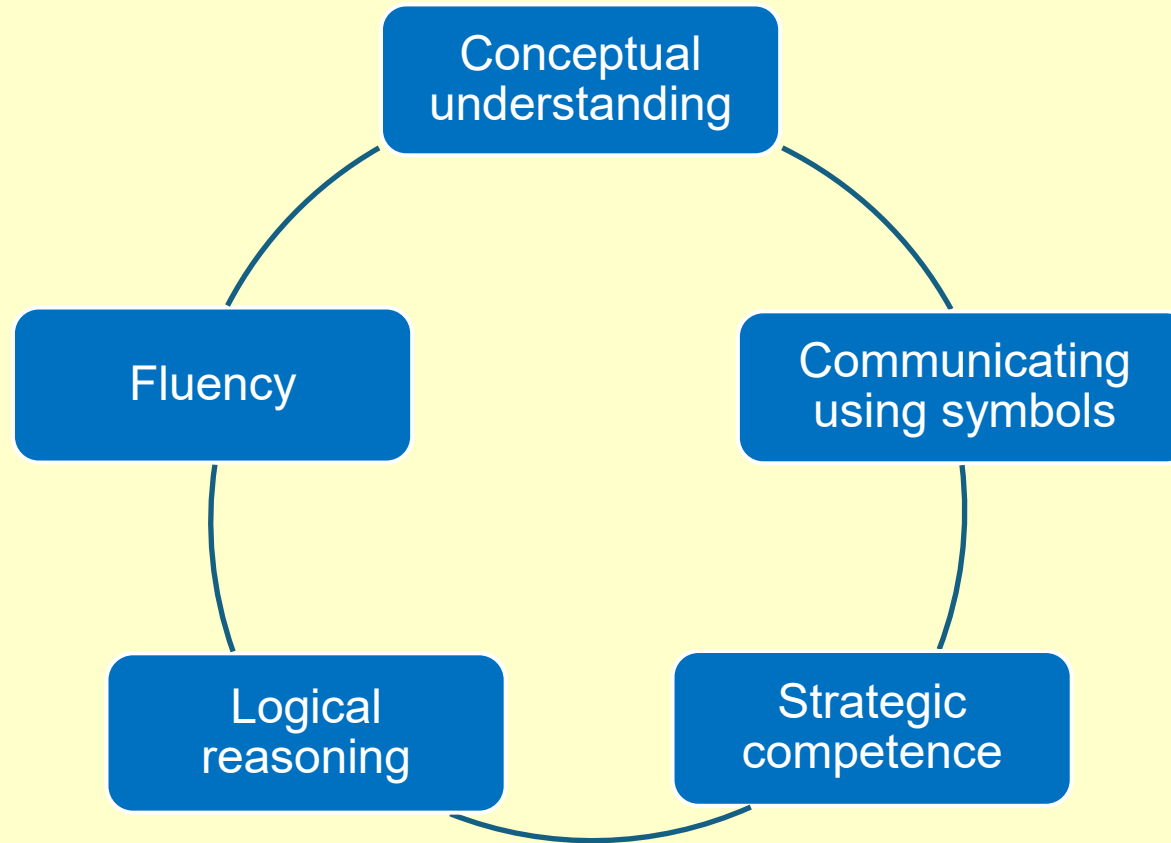
Literacy Framework

Numeracy Framework

Strand	Element	Progression step 1	Progression step 2	Progression step 3	Progression step 4
Developing mathematical proficiency	Conceptual understanding	I can make connections so that basic mathematical concepts can be transferred during play and classroom activities.	I can make connections so that mathematical concepts can be transferred during play and classroom activities.	I can make connections so that mathematical concepts can be built on and deepened.	I can make connections so that mathematical concepts can be built on and deepened.
				I can draw on my understanding of the basic structures of mathematics and can apply them in different contexts.	I can draw on my understanding of the basic structures of mathematics and can apply them in different contexts.
				I can explain and express concepts, and find examples (or non-examples).	I can explain and express concepts, and find examples (or non-examples).
		I can understand and use basic mathematical concepts in a variety of ways.	I can represent a concept in different ways, flowing between different representations including verbal, concrete, visual, digital and abstract.	I can represent a concept in different ways, flowing between different representations including verbal, concrete, visual, digital and abstract.	I can represent a concept in different ways, flowing between different representations including verbal, concrete, visual, digital and abstract.
	Logical reasoning	I can explore answers within the context of the problem and I am beginning to consider whether answers are sensible.	I can interpret answers within the context of the problem and consider whether answers are sensible.	I can interpret answers within the context of the problem and consider whether answers, including calculator, analogue and digital displays, are sensible.	I can interpret answers within the context of the problem and consider whether answers, including calculator, analogue and digital displays, are sensible.
		I can use everyday and mathematical language to talk about my own ideas and choices.	I can use everyday and mathematical language to talk about and explain my own ideas and choices.	I can construct and develop a mathematical argument.	I can construct and develop a mathematical argument.
				I can justify my procedures and predictions.	I can justify my procedures, predictions and conjectures.
			I can verify results and solutions.	I can verify results and solutions.	I can verify and prove results and solutions.
				I can explain results and procedures precisely using appropriate mathematical language.	I can explain results and procedures precisely using appropriate mathematical language.



Mathematical proficiencies



Mathematical concepts and ideas should be built on, deepened and connected as learners experience increasingly complex mathematical ideas. Learners demonstrate conceptual understanding through being able to explain and express concepts, find examples (or *non-examples*) and by being able to represent a concept in different ways, flowing between different representations including verbal, *concrete*, visual, digital and *abstract*.

As learners experience increasingly complex concepts, they should also develop an understanding of the relationships between and within these concepts. They should apply logical reasoning about these relationships and be able to justify and prove them. Justifications and *proof* should become increasingly abstract, moving from verbal explanations, visual or concrete representations to abstract representations involving symbols and conventions.

Can you match the proficiency with its definition?

Learners should understand that the symbols they are using are abstract representations and should develop greater flexibility with the application and manipulation of an increasing range of symbols, understanding the conventions of the symbols they are using.

Learners should become increasingly independent in recognising and applying the underlying mathematical structures and ideas within a problem, in order to develop strategies to be able to solve them.

As learners experience, understand and effectively apply increasingly complex concepts and relationships, fluency in remembering facts, relationships and techniques should grow, meaning that facts, relationships and techniques learned previously should become firmly established, memorable and usable.

Question - What skills are needed in order to answer this word problem?

A school library is organizing new mathematics books.

There are **3 shelves**, and each shelf holds **24 books**.

Later, the librarian donates **18 books** to another school.

Question:

How many mathematics books are left in the library?

Cwestiwn: - Pa sgiliau sydd eu hangen er mwyn ateb y broblem eiriol hon?

Mae llyfrgell ysgol yn trefnu llyfrau mathemateg newydd.

Mae **3 silff**, ac mae pob silff yn dal **24 llyfr**.

Yna, mae'r llyfrgellydd yn rhoi **18 llyfr** i ysgol arall.

Cwestiwn:

Faint o lyfrau mathemateg sydd ar ôl yn y llyfrgell?



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Reading Comprehension

Mathematical vocabulary

A school library is organizing new mathematics books. There are **3 shelves**, and **each** shelf holds **24 books**. Later, the librarian **donates 18 books** to another school.

Reasoning

Fluency in Mathematical Operations

Question:

How many mathematics books are **left** in the library?

Problem-Solving Strategies



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Planning Numeracy across the Curriculum

Task Plan and Present a Numeracy lesson

- Select a year group (Year 4 or Year 6).
 - Select one strand from the Numeracy Framework
 - Identify one numeracy expectation that is appropriate for your chosen year group.
 - Design a 20-30 minute activity that teaches this skill through another curriculum area (e.g. science, humanities, expressive arts).
-
- Which Numeracy Framework skill are you developing?
 - Learning objective and success criteria?
 - How is the activity is interesting and meaningful?
 - How would you differentiate for learners with different needs?
 - How would you assess whether learners have achieved the objective?

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Darpar athro:		Dosbarth / Grŵp	
MDPh neu bwn:		Dyddiad (sylwch y gall y sesiwn hon fod yn un barhaus):	
Cysylltiadau ystyrlon â'r Cwricwlwm (Datganiadau o'r Hyn sy'n Bwysig, Dogfiriadau dysgu, y cwricwlwm 'slamord'...)			
Cysylltiadau ystyrlon ar draws y Cwricwlwm (Cysylltiadau â hysbysu eraill neu'r Cymunedau allanol Trawsnewid Addysg)			
Targedau Personol (targedau a'r effaith ganioliadol ar ddysgu – cyfeirir at unrhyw dargedau sydd wedi'u nodi yn y dyddiwr dysgu neu gyfarfod dysgu'r hyn sydd i'w dymunir ar ddysgu)			
Bwriad Dysgu 'Dylai hyn ganioli'r hyn a'r dysgu gan y dysgbyddion yn ystod y weith, yn hytrach na'r hyn y byddant yn ei wneud, a dylai fod yn ffrwyth o'r hyn, yn gwrthdaro ac yn H. a M. 2018 t. 196)			
Meini prawf llwyddiant Yr hyn mae angen i'r dysgbyddion ei ddangos i fodloni'r Bwriad Dysgu yn llwyddiannus.			

Planning

Student-teacher:		Class / Group:	
AoLE or Subject:		Date <i>(please note that this may be a continuous session):</i>	

Meaningful links to Curriculum (What Matters Statements, Descriptions of learning, 'previous' curriculum...)	
Meaningful links across the curriculum <i>Links to other AoLEs or the Cross-curricular skills frameworks</i>	
Personal Targets (targets and consequent impact on learning - refer to any targets that have been identified in learning journal or weekly reflection to show the desired impact on learning)	
Learning Intention <i>'This should focus on the pupils' learning during the lesson, rather than what they will be doing, and should be short, achievable and measurable.'</i> 2016 p. 196)	
Success Criteria <i>What the pupils need to demonstrate to successfully meet the Learning Intention.</i>	

SEQUENCE OF TEACHING & LEARNING (Add or remove rows below as appropriate)				
Timing: <i>Break down timings into groups if appropriate. ensure pupils are 'doing' quickly and that transitions are taken into account</i>	Role of the teacher & support staff: <i>e.g., key questions, retrieval of prior learning, modelling and explanations, checking understanding, planned use of additional adults.</i> <i>Choice of pedagogical model or of the 12 pedagogical principles</i>	Pupils' learning and activities: <i>What will the pupils be learning to do and what activities / resources will facilitate this?</i> <i>Please refer to Foundation Learning planning document for details of continuous provision.</i>	Inclusive Strategies (including differentiation): <i>Reasons for and details of scaffolding.</i> <i>Types of representation in tasks.</i>	Check what pupils know, understand, and can do: <i>Key questions, types of retrieval practices, self and peer assessment opportunities, purposeful AfL strategies, live marking opportunities, planned feedback.</i>

Task -
To plan a short numeracy activity

Shape & Space

Problem 3:

You have 6 squares and 4 triangles.

- . Can you make a picture using all the shapes?
- . What shapes can you see inside your picture?
- . How is your picture the same or different from someone else's?

Measures (Length/Capacity)

Problem 4:

Which container holds the most water?

- How can you find out?
- How can you make it fair?
- What could you use to measure?

Addition and Subtraction

Problem 2:

There are 18 children in the class. Some are wearing jumpers and some are not.

- . How many could be wearing jumpers?
- . Can you show your thinking in more than one way?

Number & Place Value

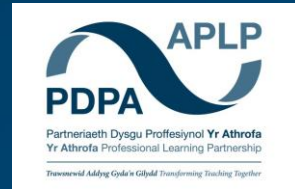
Problem 1:

Sam has 14 cubes. He wants to share them between two trays.

- . How many different ways can he do this?
- . How do you know you've found them all?
- . What do you notice about the numbers?



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