Solo Taxonomy

A model developed by John Biggs & Kevin Collis
and developed by Pam Hook

Teaching, Learning & Assessment in Argyll & Bute Schools

An Approach

We are in a time of changed expectations

- **If you walked into any class in your school, how different would the teaching and learning you observe be from 5 years ago?**

- **What is expected of schools in the 21st century that has changed how we must operate?**

- **Can you think of three ways that you are adapting to this change?**
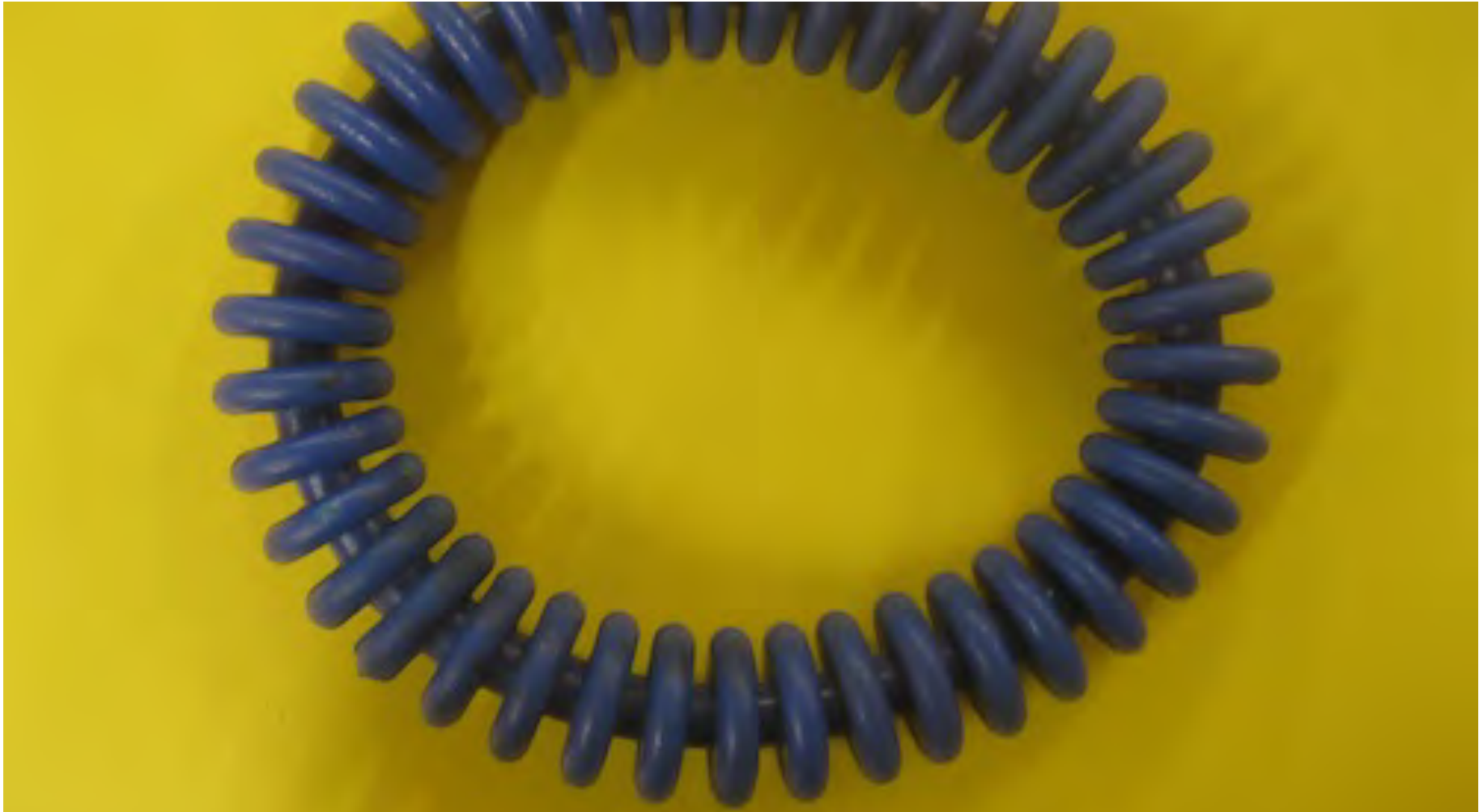
...the balls we are trying to juggle

...this can make us feel

…or sometimes a bit

We would like to achieve joined up and meaningful planning, assessment and moderation

...in a simple and natural way

Introducing SOLO Taxonomy

SOLO means the Structure of Observed Learning Outcomes

❑ With SOLO Taxonomy, students and teachers are able to:

- Design learning intentions and learning experiences with built in assessment at the **planning** stage

- Construct and use effective **success criteria** to aid formative & summative assessment

- Provide meaningful **feedback** and **feed forward** assessment of learning outcomes

- Reflect meaningfully on what to do next to improve a child's learning and to improve the teaching process

What is SOLO Taxonomy?

- A simple and robust way of describing how learning outcomes grow in complexity from surface to deep to conceptual understanding

- It describes 5 levels of understanding for students who are encountering **new learning**

- Helps answer the question, **'What have they learned as a result of my teaching?'**

- The distinction between each level is clearly categorised with **teachers** and **students** agreeing on the SOLO level of a learning outcome they are working on.
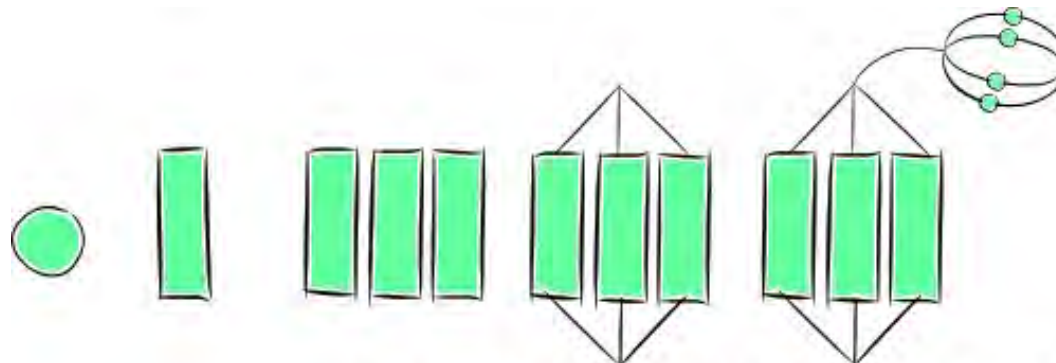
Levels of Understanding in SOLO Taxonomy

❑ **Prestructural**

- The student attacks the task inappropriately
- The student collects information but it has no organisation or connection
- Information collected may be irrelevant
- The student may have 'missed the point'
- The student can't start without a high level of support

'I am not sure what photosynthesis is. I think it might be a type of plant.

I need help to understand photosynthesis.'

Levels of Understanding in SOLO Taxonomy

❑ **Unistructural**

- The student picks up one aspect of the task but their understanding is disconnected or limited.

'Photosynthesis is a process used by plants.

I know one relevant idea about photosynthesis.'

Levels of Understanding in SOLO Taxonomy

❑ **Multistructural** – a **quantitative** change from Unistructural

The student knows **several** aspects of the task but misses their **relationship** to each other and the **whole**.

As for Unistructural plus:

'Photosynthesis is a process used by plants to convert light energy.

Light energy is converted into chemical energy.

I know several relevant ideas about photosynthesis.'

Levels of Understanding in SOLO Taxonomy

❑ **Relational** – the change from Multistructural is **qualitative**

• The student links and integrates the aspects, which contribute to a coherent understanding of the whole.

As for multistructional, plus:

'This is because chemical energy can be used as fuel by the plant. For example, green plants absorb light energy using chlorophyll in their leaves. They use it to react carbon dioxide with water to make a sugar called glucose.

I understand several relevant ideas about photosynthesis, and can link these some way.'
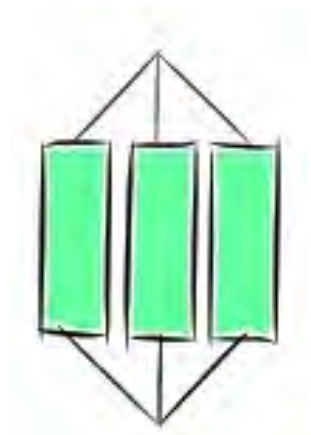
# Levels of Understanding in SOLO Taxonomy

❑ **Extended Abstract**

- The student **rethinks** their new understanding at the relational level, looks at it in a **new way**, and uses it as the basis for **prediction**, **generalisation**, **reflection** or **creation** of new understanding.
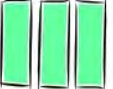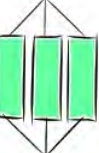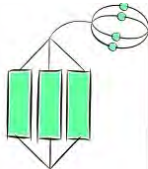
As for relational plus:

'Without the correct amounts of light, carbon dioxide and heat, photosynthesis will be limited in a plant. Farmers need to understand the inter-relatedness of these three factors to maximize crop growth. The use of paraffin lamps inside greenhouses increases the rate of photosynthesis because burning paraffin produces carbon dioxide and heat.

I understand several relevant ideas about

*photosynthesis, I can links these and look at these linked ideas*

in a new way.'
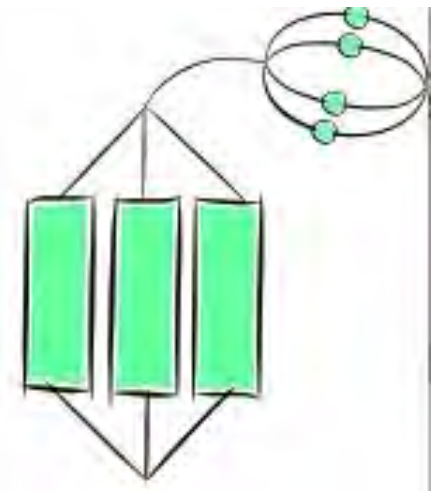
Recap: The 5 Levels of SOLO

- Prestructural = "I need help or direction."

- Unistructural = "I will have a go at it." or "I can do it if directed."

- Multistructural = "I will use trial and error to find a solution."

- Relational = I plan to do X because it will…I know what to do and why."

- Extended Abstract = I know what to do to find the best solution. I seek feedback and adjust my actions in response."

Prestructural
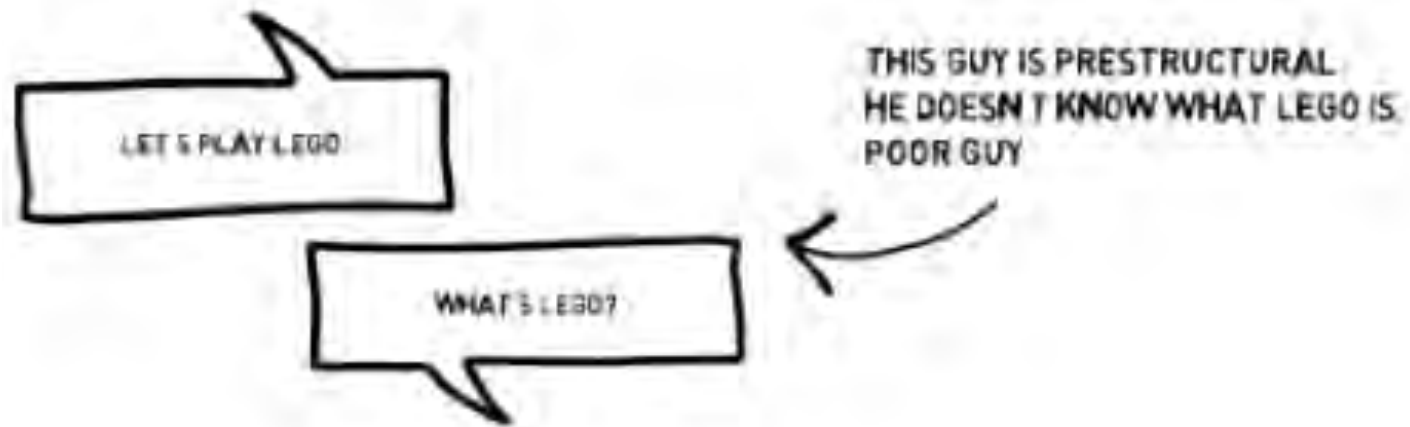
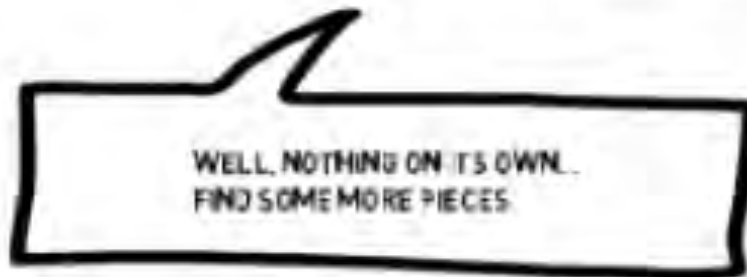# Unistructural
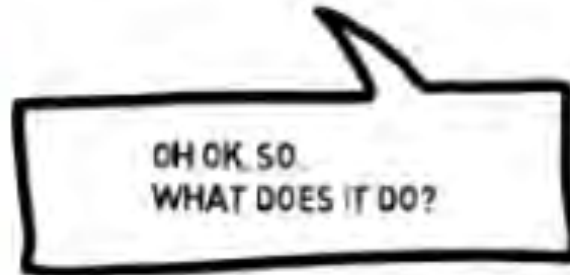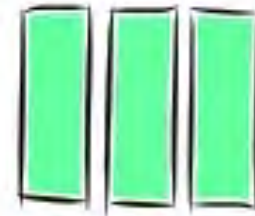
Multistructural

OKAAAAAY... BUT WE STILL JUST HAVE A PILE OF BRICKS. LET'S MAKE SOMETHING

TADAH!

HAVING SEVERAL LEGO BRICKS (MULTISTRUCTURAL) IS A GOOD START. BUT IT DOESN'T MAKE ANYTHING UNTIL YOU KNOW HOW TO PUT THEM TOGETHER.

Relational

LOOK, LOOK!
I MADE A
SPACESHIP!
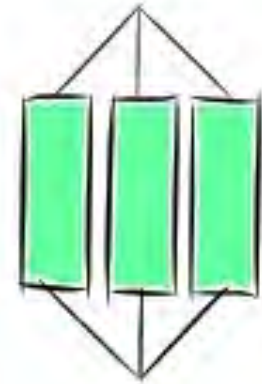
NOW HE KNOWS HOW THE PIECES FIT TOGETHER,
HE HAS A RELATIONAL UNDERSTANDING OF LEGO.
HE PROBABLY STILL NEEDS THE INSTRUCTIONS THOUGH...

Extended Abstract

YEAH, WHATEVER.
LOOK WHAT I MADE.
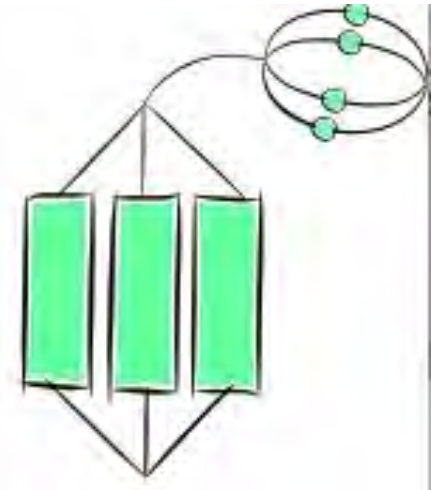
EXTENDED ABSTRACT IS WHERE
IT'S AT. THIS GUY HAS TAKEN
WHAT HE KNOWS ABOUT PUTTING
LEGO TOGETHER TO MAKE
SOMETHING NEW, NOT FROM
INSTRUCTIONS.

AND IT'S AWESOME.

Recap
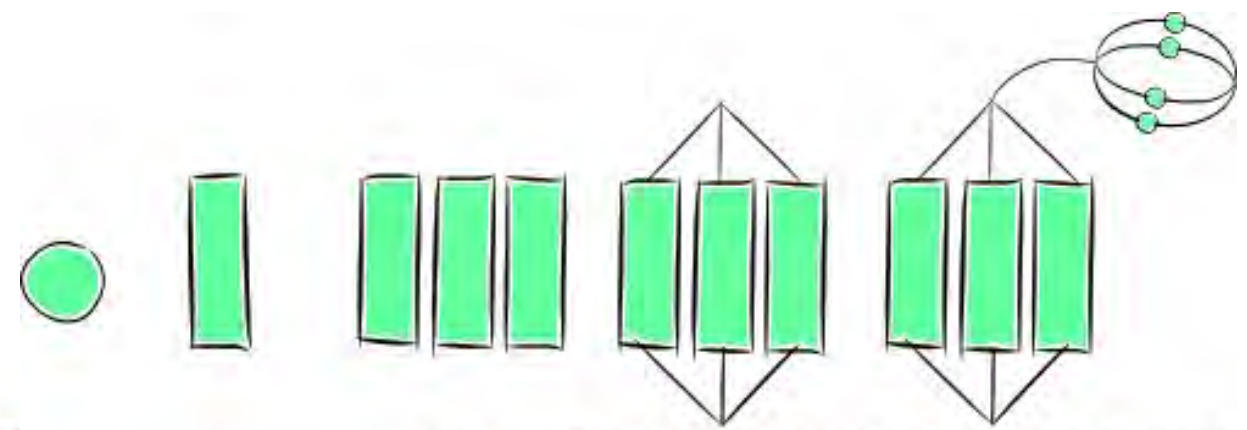
SO, TO RECAP THE STAGE

PRESTRUCTURAL	UNISTRUCTURAL	MULTISTRUCTURAL	RELATIONAL	EXTENDED ABSTRACT
NO LEGO				

OR IN OTHER WORDS

| CLUELESS | HEARD OF IT. | GETTING THERE. | GOT IT | OWNED IT. |
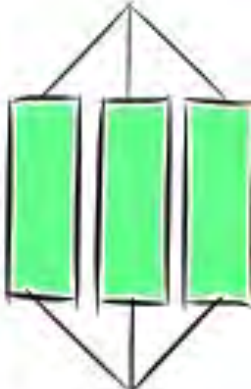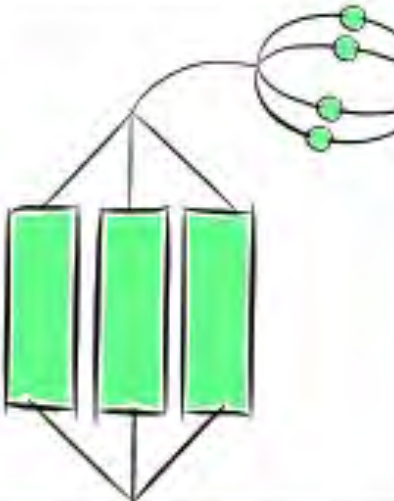
SOLO – HOW WELL DO YOU UNDERSTAND

SOLO Taxonomy and ACfE

- Provides a framework for teachers to **plan** progression of skills by using **solo verbs**

- Ensures that teachers **build in** appropriate challenge to their lessons and activities at the **planning** stage

- Encourages teachers to consider the depth of learning at the **planning** stage

ask: How can I make butter from cream?

estructural	Unistructural	Multistructural	Relational	Extended Abstract
eds teacher's help	One relevant aspect	Several relevant independent aspects	Integrated into a structure	Generalised into a new idea
ideas sses the point	I can draw how I made butter	I can draw and list/label how I made butter	I can explain the process of making butter using 'because' as I draw and list/label how I made butter	I can relate my experience of making butter to commercia butter making in the dairy industry and compare and contrast the processes.

quipment:
ream
r with lid
ttp://youtu.be/qwb2uZLSLhw Commercial butter making process

Achieving **Progression** with SOLO

- Provides a mental model of **differentiated learning outcomes** for students, parents & teachers
- Students can **peer assess** and **self assess** their learning outcomes
- Gives 'feedback' – how well a student is doing
- Gives 'feed up' – where the student should be going – lets students see the possibilities
- Gives 'feed forward' – the next steps in learning and teaching –how to get there

Self Assessment Using SOLO

Recording Evidence & Our Assessments
Dylan William

Formative Assessment Record & Evidence – A CHALLENGING, RELEVANT & EXCITING CURRICULUM
Interdisciplinary Learning / Broad General Education
Special Week 2
Focus: The Garden

name	I can work Independently	I can collaborate within a team	I can cooperate in a team to reach a goal	I can listen to instructions	I can communicate my ideas	I can use tools for a specific purpose	I can record facts	I can record facts	I can ask good questions
Sophie	Observation	Observation	Observation	Observation					
Freyja	Observation	Observation	Observation	Observation					
Thom	Observation	Observation	Observation	Observation					
Benjamin	ABSENT								
Lewis	Observation	Observation	Observation	Observation					
Lorenz	Observation	Observation	Observation	Observation					
Rose	Observation	Observation	Observation	Observation					
Jack	Observation	Observation	Observation	Observation					
Morven	Observation	Observation	Observation	Observation					
Connor Coombes	Observation	Observation	Observation	Observation					
Connor Coley	Observation	Observation	Observation	Observation					
Nettah	Observation	Observation	Observation	Observation					
Bob	Observation	Observation	Observation	Observation					
Ben M	Observation	Observation	Observation	Observation					
Angus	Observation	Observation	Observation	Observation					
Todd	Observation	Observation	Observation	Observation					

Evidence

Health & Wellbeing Skills	Literacy	Technologies	Social Subjects & Science (Knowledge & Comprehension)	
I can work Independently I can collaborate within a team I can cooperate in a team to reach a goal	I can listen to instructions I can communicate my ideas	I can use tools for a specific purpose	I can recall facts I can record facts I can ask good questions I can carry out a simple experiment	

Types of Evidence	Observation	Peer Assessment	Transference of skills (skills that can be transferred from one task and used in another)	
Learning Story	Self-assessment	Oral feedback	Display/photos	

SOLO Taxonomy & Challenge

- Using SOLO, teachers can **plan** a range of materials/tasks providing children with a **challenge** that is suitable to their level of ability from **prestructural** to **extended abstract**.

- In a maths lesson on algebra, for example, tasks could be **planned** for a child who **knows nothing** about algebra to a child who can **design** algebraic puzzles for other children to complete.

Integrated Planning & Assessment

Measure: Length   First Level

MNU 1 -11a I can estimate how long or heavy an object is, or what amount it holds, using everyday things as a guide, then measure or weigh it using appropriate instruments and units.

●	I	III	(symbol)	(symbol)
	I can identify different lengths of objects using words longer, longest, shorter, shortest.	After measuring items using metres and cm's I can place objects in order of size.	I can measure length, breadth and height using metres and cm's accurately. I know why it is important to measure accurately e.g. fit a carpet. I can choose the appropriate device to measure the object of my choice. I can record accurately measurements 1m.25cm / 125cm / 1.25M I can find areas of simple shapes using a squared grid.	I can calculate the area of a variety of shapes using the Formula A=LxB and use my findings to cover the area e.g. carpet / tiles /cloth
SOLO Verbs	Identify, label	Follow a procedure, describe, list	Organise, order, explain, relate	Predict, prove, apply
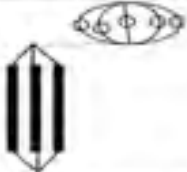
Integrated Planning & Assessment

Measure: Volume   Early Level

MNU 0-11a I have experimented with everyday items as units of measure to investigate and compare sizes and amounts in my environment, sharing my findings with others.
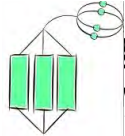
●	I	III	▯	▯ (with eye symbol)
	I can identify different sizes of containers. I can identify that different containers are used for different liquids. Eg milk shampoo olive oil.	I can place containers in order of size. I can fill a large container with water using a smaller container estimating how many it will take. During the experiment I can count how many and record the number.	I can organise containers which hold 250ml, 500ml, 1 litre and 2 litres. And place them in order. I can prove that 2 x 1litre carton will fill a 2 litre container	I can measure the volume of my hand when I plunge it into the water. I do this by measuring the amount of water which is displaced or by measuring what is left in the container
SOLO Verbs	Identify, label	Follow a procedure	Organise, order, explain	Predict, prove, evaluate

SOLO – A Common Language for Learning
Learning VERBS

- **Prestructural** ⬤ teacher help is needed to achieve the learning outcomes

- **Unistructural** ▯ – **describe, identify, draw, find, label, match, follow a simple procedure**

- **Multistructural** ▯▯▯ – describe, list, outline, follow a pattern, combine

- **Relational** ▯▯▯ – sequence, classify, compare and contrast, explain causes, explain effects, analyse, form an analogy, organise, distinguish, interview, question, relate, apply

- **Extended Abstract** ▯▯▯ generalise, predict, evaluate, reflect, hypothesise, theorise, create, prove, plan, ___, argue, compose, prioritise, design, construct, perform

*With **SOLO**, in contrast to **Bloom's Taxonomy**, a learning task can sit **at one level of cognitive complexity** while the learning outcome can **be assessed across 5 different levels of complexity.***

Recap: LEARNING VERBS

- **Unistructural**

Define   name   find   match   identify   draw   label   recall

- **Multistructural**

Describe   outline   list   follow a procedure

- **Relational**

Sequence   compare and contrast   explain effects   make an analogy   distinguish   question   classify   explain causes   analyse   oraganise   interview   apply

- **Extended Abstract**

Generalise   evaluate   hypothesise   prove   justify   compose   design   perform   predict   reflect predict   plan argue   prioritise   construct   invent

SOLO Taxonomy & Depth

- Solo encourages teachers to **plan** the amount of deep learning going on in their lessons.

- *Do students have opportunities **to apply skills** and take them **further** to the **extended abstract** or is most teaching in the **multistructural** domain where **skills and knowledge are being taught but opportunities to make connections & to show application** are not given regularly?*

- The **learning verbs** can be used by teachers to understand how to scaffold learning intentions for **deep conceptual understanding**

For example in a lesson in RME on churches:

***Unistructural** learning intention – **DRAW** a church*

***Multistructural** learning intention – **DESCRIBE** the main features of a church*

***Relational** learning intention – **Compare and Contrast** two different churches*

***Extended Abstract** learning intention – **Design** a church for the 21st century*

Depth: A Visual Explanation

Unistructural

I know one thing about what we're learning
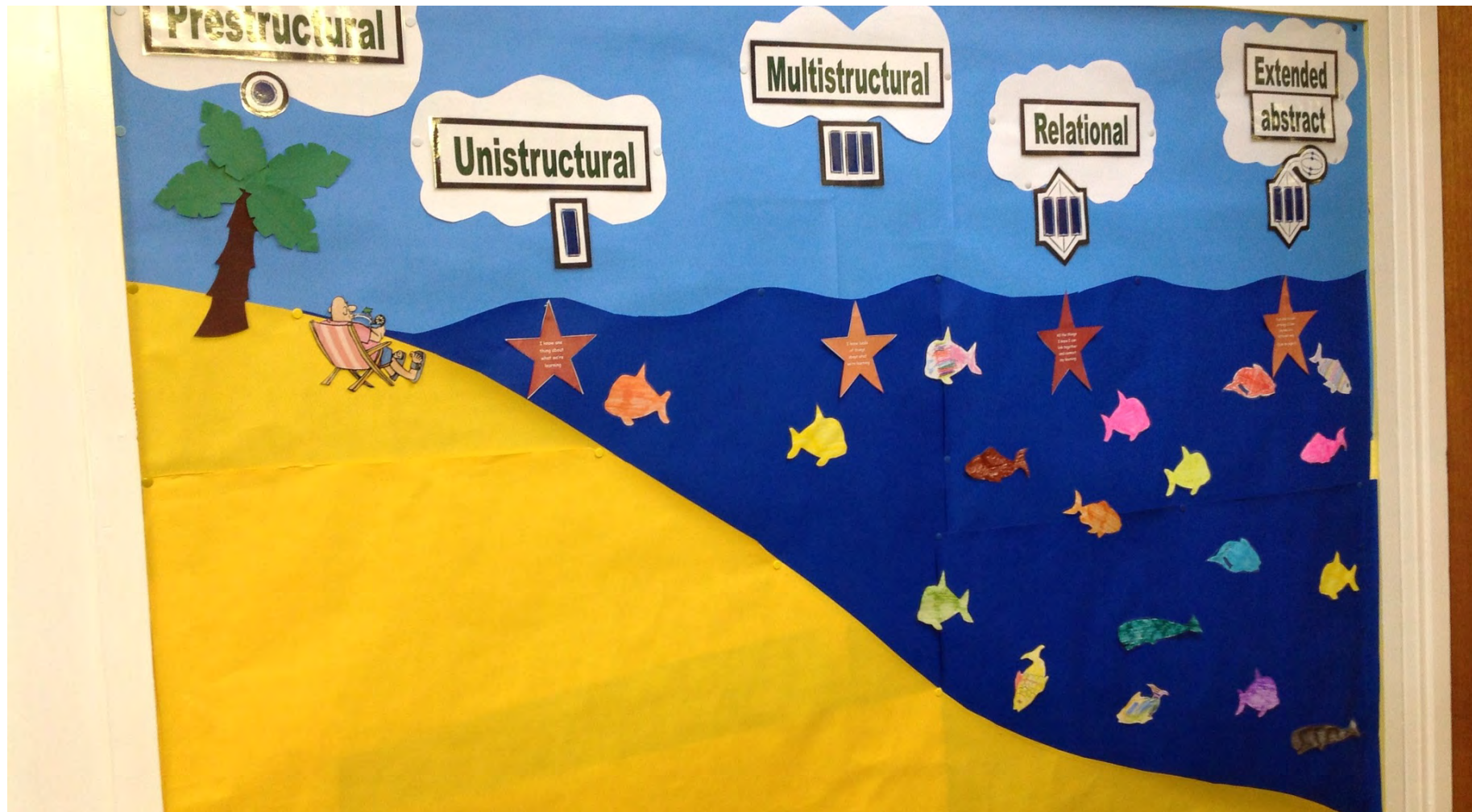
SOLO Taxonomy & Personalisation

- Solo provides teachers with the opportunity to 'let go' and to stand back and see where their students will choose to go with their learning.

- Using solo, teachers can **plan** a choice of tasks at different cognitive levels and let the students decide how they want to proceed using the agreed **learning intentions** and **learning verbs**.

Primary 2 test the pH level of soil

I chose to read on my own

We chose to read together

I chose to read to a P.1

I chose to write a book review

We chose to draw illustrations

SOLO Taxonomy & **Interdisciplinary Learning**

- Solo fits in very well **with interdisciplinary learning** and a **broad, general education** by providing the scaffolding to help with **planning appropriate learning intentions** which will address the **seven principles of curriculum design.**

- SOLO develops a **shared understanding** for students and teachers to provide meaningful **formative assessment feedback** in the journey towards achieving the final outcome.

I can draw how I made butter.

How do you make butter?

measure cream in a jug 150ml

put cream in a jar
- double cream
- whipping cream
- extra thick cream

double cream had no buttermilk

we took turns to

How do you make butter?

double cream had no buttermilk

double cream
whipping cream
extra thick cream

we took turns to shake the cream in the jar "agitate"

for about 20 minutes

Chemical reaction
fat molecules joined together

squeezed out buttermilk

cream became yellow when it changed to butter, extra thick cream was most yellow in colour also best for spreading
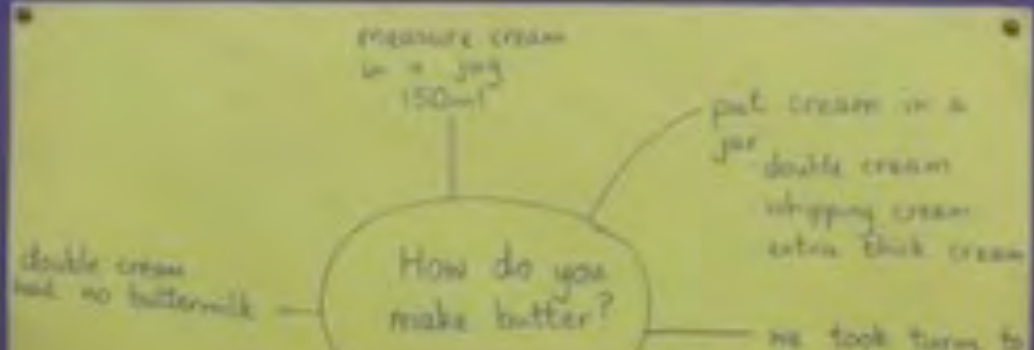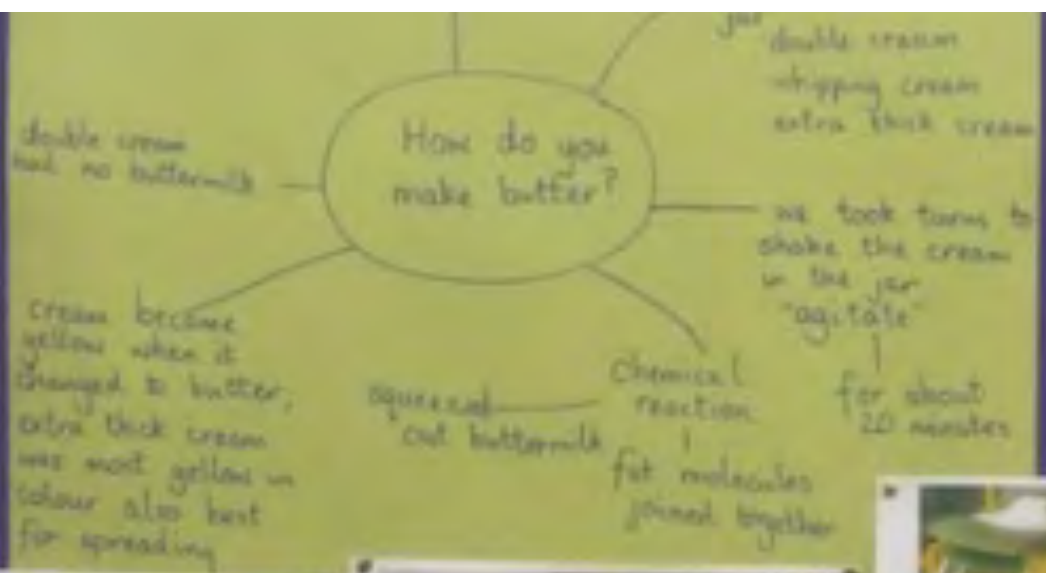
How do you make cheese?
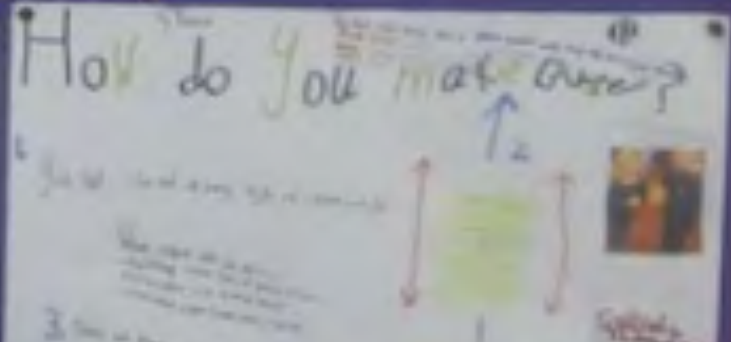
How do You make Butter?

By Rebecca

In real life they use a Butter macher, and they use salt (lots of salt)
First it is = cream
Next = Popcorn Butter. with Butter milk, salt.
Next = Butter. it takes them 30 minutes.

1. You put 150 ml of eany type of cream in a jar

What cream Did We use =
• Whipping cream (lots of Butter milck)
• Duble cream (no Butter milck)
• extra thick cream (more Butter milck)
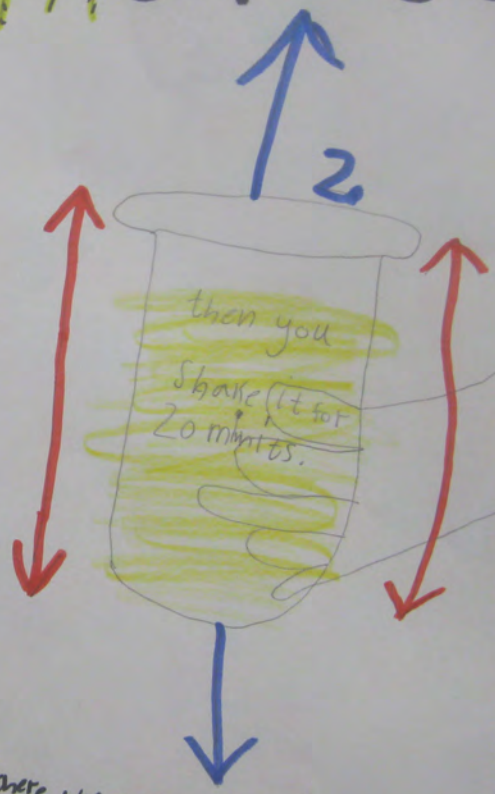
3. then we poured all the Buttermilk out of the jar and there was Butter in the jar

We Done it in groups so we took turns to shake the jar

then you shake it for 20 minutes.

2.

Sophie and Reb shakeing the

Ben and Lewis eating there Buttered Bread.

Called a chemical Reacion
When you shake the cream all the Fat in it comes together and Pushed all the Butter milck out of the cream that how it makes Butter.

Mrs Thomson & parents the Butter and Butter milk

Solo & AifL

- Solo allows teachers and students to create meaningful **success criteria** based on the desired outcome
- Students can self and peer assess to find out where they are with their learning
- SOLO answers the questions, '**How well am I doing?**'
- '**Where do I go next?**'

For example:

*My learning outcome is **multistructional** because I didn't explain my learning enough. Next time I will add more 'becauses' to get to the next level.*

*My learning outcome is at a **relational** level because I have linked ideas by explaining them. My next step is to look at the bigger picture and make a generalisation about these linked ideas to a real life context.*

Key Messages from Prof. Dylan William Seminar

- Most important use of assessment is **during** the lesson

- We cannot do the learning for the learner but the teacher has to **create the environment** for learning to take place.

- Teachers must find out **what children know** so they then **know what to teach**

- Assessment practices should answer these two **fundamental** questions:

➢ Did **my teaching** result in the **learning** that I wanted?

➢ What did my **pupils learn**?

- There is a danger in thinking that all **learning** is **measurable**, too often assessment gets in charge of the learning process and teachers make only the *components of learning that can be measured* the important parts.

- Do we know if our pupils are **accumulating knowledge** or **learning** and **forgetting** – how do our assessment practices help or hinder this behaviour?

- We need to design assessment systems that **encourage** and **reward accumulation** of **knowledge**

- There is **no** such thing as a **valid assessment**, validity only comes from *the conclusion the teacher wants to draw* based on the available **evidence** to back up this judgment.

- One single assessment will **never** give a teacher sufficient data

- Assessments must be a **balance** between the **academic** and **practical** so that children are given opportunities to show **application** of knowledge and to encourage teachers to continue to **give practical experiences** to children as part of their learning.

Are You Multistructional...?

References & Links

- Pam Hook& Julie Mills (2011): Solo Taxonomy: A Guide for schools Book 1
- SOLO Taxonomy Explained Using Lego - http://youtu.be/uDXXV-mCLPg
- http://pamhook.com
- www.slideshare.net/didau/introduction-to-solo-taxonomy
- www.johnbiggs.au/academic/solo-taxonomy/
- learningspy.co.uk/solo-taxonomy/
- www.optimus-education.com/helping-students-progress-using-solo-taxonomy
- www.in2edu.com/learning/thinking/educational_thinking_tools.html

…and remember

SUSTAINABLE CHANGE STARTS WITH THINKING AT THE EDGES OF THE BOX. IT'S ABOUT EVOLUTION, NOT REVOLUTION.