essential resources

SOLO Taxonomy and Hexagonal Thinking

Pam Hook

"Hexagonal thinking has no age limits. Using SOLO Hexagons is a simple and powerfully effective way to deepen and extend the learning outcomes for students from their first to final school year and beyond."

An introduction to SOLO Taxonomy

Structure of the Observed Learning Outcome (SOLO) Taxonomy is an evidence-based model of learning that university academics John Biggs and Kevin Collis developed in the late 1970s. They based it on research exploring the structure of samples of student thinking in many different subjects (and across many different levels). The SOLO model represents the increasing structural complexity of learning outcomes as learning progresses through surface, deep and conceptual levels of understanding (Biggs and Collis 1982).

SOLO has a long history of use at a tertiary level in designing courses and assessing course outcomes, marking academic theses and determining the effect of different research interventions. Its use as a common language of learning across primary and secondary schools, including the use of different SOLO-based learning strategies, started in New Zealand in early 2000. Now SOLO is used in classrooms around the world for planning, monitoring and assessing learning. It makes the complexity of the learning task and learning outcome visible to students, enabling learners to reflect on what they are doing, how well it is going and what their next steps in learning are.

Learn more about SOLO Taxonomy –
NZ: *First Steps with SOLO Taxonomy* by Pam Hook
AU: *First Steps with SOLO Taxonomy* by Pam Hook

An introduction to hexagonal thinking

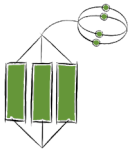
Hexagonal thinking is a powerful strategy for collaboratively surfacing relevant ideas and issues on loose hexagon tiles and then making meaning by:

- finding connections between the ideas
- forming clusters (tessellations) of tiles in honeycomb patterns
- extending these ideas by combining insights from the hexagon clusters into a collaborative summary document.

Initially developed for systems thinking in business (see Hodgson 1992), the strategy has been adapted for use in schools (see Hook 2015) using SOLO Taxonomy, the dynamic, levelled but non-linear, recursive model for growth in understanding described above.

With hexagonal thinking, the initial step of drawing out individual perspectives by placing data on hexagon tiles and accumulating these through collaboration is aligned to SOLO unistructural and multistructural levels of understanding (surface understanding). The following step of reducing the responses through collaborative connection aligns to the SOLO relational level of understanding (deep understanding). The final step, identifying a shared problem, solution or abstraction by group synthesis of the linked responses, is aligned to a SOLO extended abstract level of understanding (deep and/or conceptual) (Exhibit).

Exhibit: How hexagonal thinking aligns with SOLO Taxonomy

Step 1. Surfacing relevant ideas on hexagon tiles	Step 2. Finding meaning by connecting ideas on tiles [connect using *because, but, so*]	Step 3. Drawing conclusions from the connected ideas [make a claim … *because* … *because* …]
		
Acquiring and consolidating ideas	Interpreting ideas Making meaning – critical thinking	Defending ideas Evaluating ideas – critical thinking; Extending ideas, thinking in a new way – creative thinking
Quantitative Surface understanding	Qualitative Deep understanding	Qualitative Deep or conceptual understanding
 SOLO unistructural and multistructural levels	 SOLO relational level	 SOLO extended abstract level

The hexagon tiles used in SOLO Hexagons are a form of graphic organiser where every tile is shaped the same. They are used to construct a dynamic, adaptive and iterative visual explanation of a process or relationship.

The hexagons provide a flexible structure for collecting and then aggregating ideas, facts and information when thinking deeply about any issue. Because they are visible, the hexagons reduce the cognitive load participants feel when they discuss the reasons for (and rules behind) the flexible aggregations or hexagon clusters. The strategy is used to construct flexible tessellations of hexagons that support classroom discussion, collaborative thinking, individual thinking, critical and creative thinking, question generation and even student writing (Hook 2015).

Hexagons are a "sand-box pedagogy". When arrangements are aligned with SOLO levels, they can be used to: determine the cognitive complexity of prior knowledge, monitor learning progress (formative assessment) and evaluate learning outcomes (summative assessment).

The changing visual arrangements (patterns) of hexagons allow us to track classroom discussion in real time and the clusters themselves act as a memory and language support resource for the group, thus reducing cognitive load.

The hexagon tessellations can be used to reveal biases in our thinking, to organise our ideas, to retrieve information we have forgotten and to support claims, arguments, predictions and generalisations.

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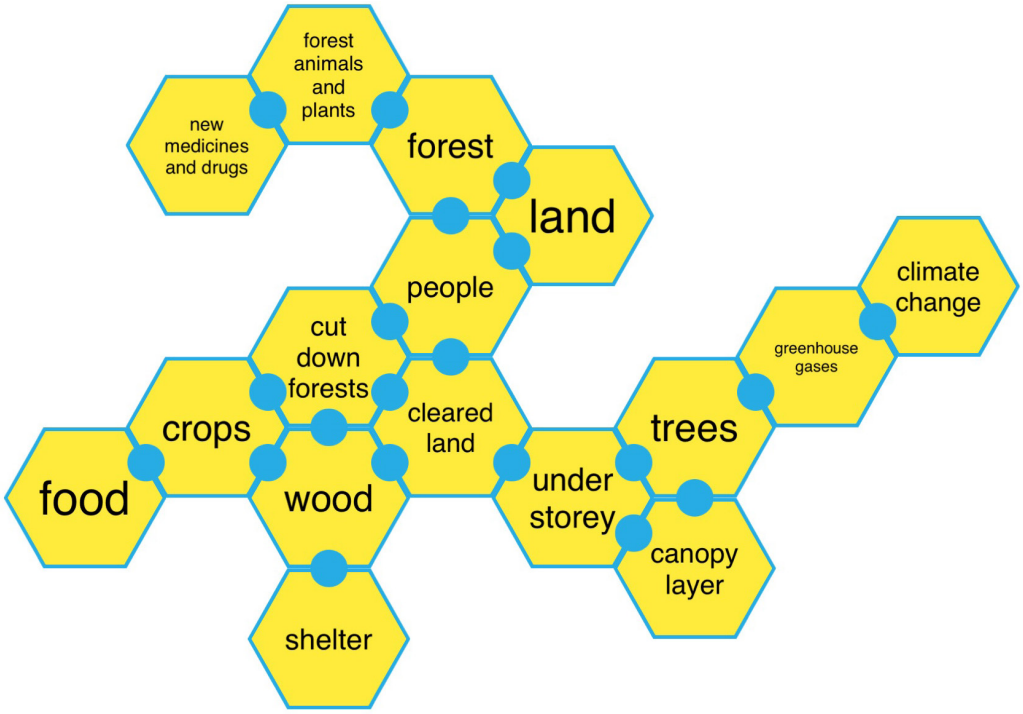
With young students, SOLO Hexagons can support storytelling and provide frames for sentence structure. With older students they can act as prompts to shift writing from surface understanding, where students simply list ideas, to deep outcomes, where students link ideas using connectives such as *because*, *but* and *so* and extend those ideas to form a claim with reasons and evidence or a reflection. The following examples of student work show how a Year 5 student (Example 1) and Year 11 student (Example 2) used their hexagon tessellation as a framework for writing.

Example 1: A Year 5 student's writing from a hexagon tessellation discussion on clearing forests



Cutting down forests

It is OK to use a forest to make space for housing or farm land? Some people agree **but** some people don't. The people who don't agree think that we should keep the forests safe for the forest plants and animals and find another way of feeding or getting homes for people. The people who do agree think that people's needs should come first. Who do I agree with?

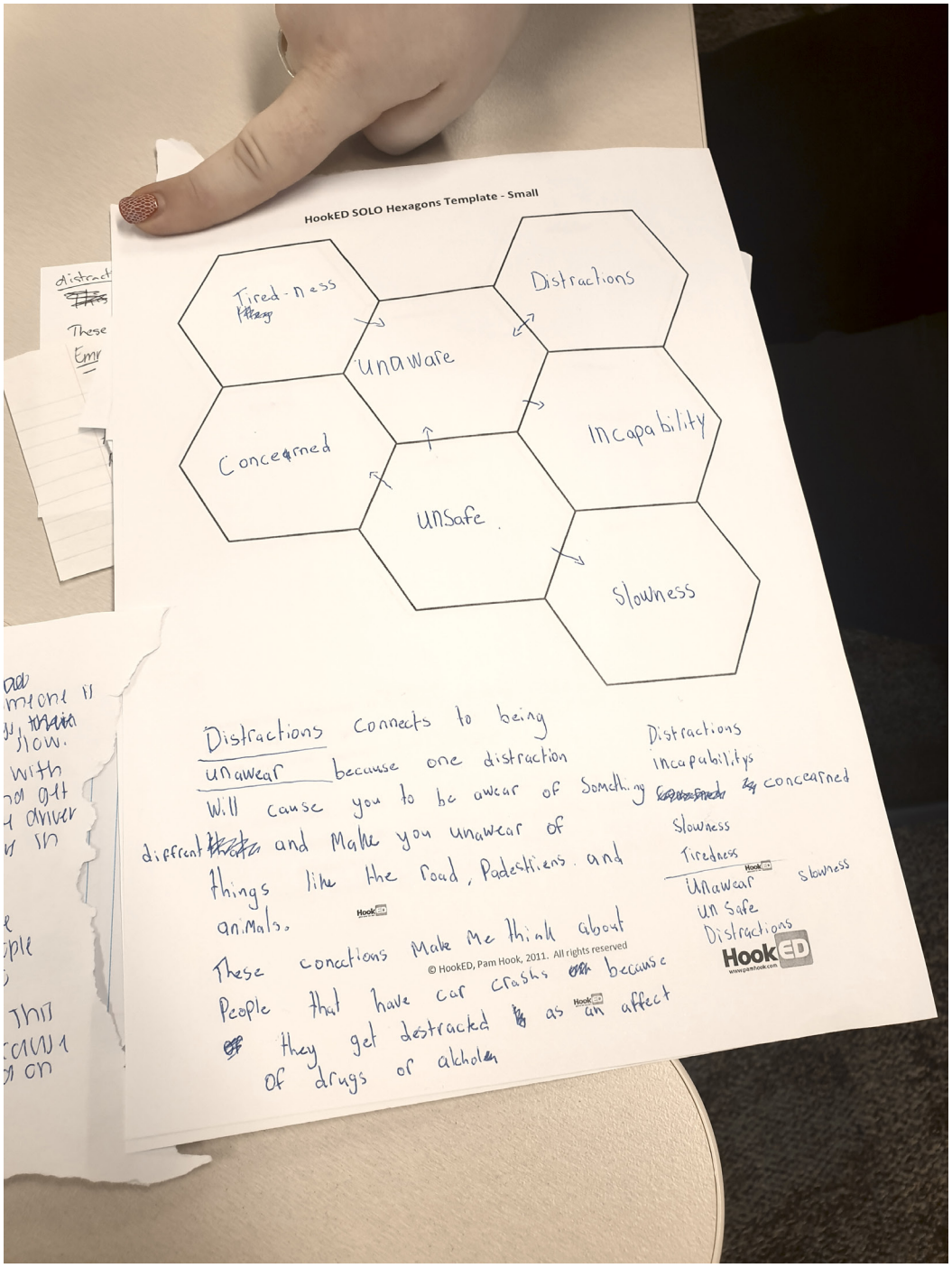
Humans need the land the forest is growing on **because** they need food and shelter. They need trees from the forest **so that** they can use the wood to build houses on the land. They cut down the forest floor and the understorey layer **because** it gives them space to build homes and plant crops. They cut down the canopy layer to get wood to build with. They do this **so that** they can look after their families. They think getting enough food and shelter for people is important so cutting down the forests is OK.

The forest has many different animals and plants. They need the forest to survive **because** it provides their food and shelter. They cannot just move to any other place. Keeping the forest is important to them.

Both people and forest animals and plants have good arguments **but** the trees also take up the greenhouse gases **so if** we keep cutting down more trees then we will make climate change worse and the planet a harder place for everyone to live in. Also, there are some animals and plants we know nothing about. If we cut down the forest **then** we could destroy them without finding out how they could help us find new drugs and medicines in the future. Finally, we still need forests **because** we need to grow trees for building with.

I think we should be careful about how much forest we cut down **because** we do not know what will happen if we let them all be cut down.

Example 2: Year 11 student's writing from hexagon tessellation about "Distractions" in the context of safer journeys



"Distractions" connects to being "unaware" **because** one distraction will cause you to be aware of something different and make you unaware of things like the road, pedestrians and animals. **These connections make me think about** people that have car crashes as an effect of drugs or alcohol.

Find out more about hexagonal thinking:

NZ: *SOLO Taxonomy and Hexagonal Thinking* by Pam Hook

AU: *SOLO Taxonomy and Hexagonal Thinking* by Pam Hook